

CALIFORNIA HIGH-SPEED TRAIN

Project Environmental Impact Report /
Environmental Impact Statement

DRAFT

Special-Status Plant Survey Report

Merced to Fresno Section
Draft Project EIR/EIS

August 2011



CALIFORNIA
High-Speed Rail Authority



U.S. Department of Transportation
Federal Railroad Administration



DRAFT
FIELD REPORT

Merced to Fresno Section
Special-Status Plant Survey Report

Prepared by:

AECOM
CH2M HILL

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List of Abbreviated Terms

°F	degrees Fahrenheit
amsl	above mean sea level
APN	Assessor's Parcel Number
BNSF	Burlington Northern Santa Fe Railway
Caltrans	California Department of Transportation
CCR	California Code of Regulations
CDEC	California Data Exchange Center
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
cm	centimeter
CNDDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CWHR	California Wildlife Habitat Relationships
EIR	environmental impact report
EIS	environmental impact statement
ESA	Endangered Species Act
FR	Federal Register
FRA	Federal Railroad Administration
GIS	geographic information system
GPS	global positioning system
HMF	heavy maintenance facility
HST	high-speed train
HUC	Hydrologic Unit Code
JD	Jurisdictional Delineation
mph	miles per hour
NAD	North American Datum

NEPA	National Environmental Protection Act
NMFS	National Marine Fisheries Service
NRCS	Natural Resource Conservation Service
PEMC	palustrine emergent seasonally flooded
PEMF	palustrine emergent semi-permanently flooded
PFO	palustrine forested wetland
RTP	regional transportation plan
SR	State Route
spp	species (plural)
ssp	subspecies
UPRR	Union Pacific Railroad
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Service
var.	variation
WRCC	Western Regional Climate Center

1.0 Introduction

The California High-Speed Train (HST) System, as shown in Figure 1-1, is planned to provide intercity, high-speed service on more than 800 miles of tracks throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The HST System is envisioned as a state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology, which will include contemporary safety, signaling, and automated train-control systems. The trains will be capable of operating at speeds of up to 220 miles per hour (mph) over a fully grade-separated, dedicated track alignment.

Two phases of the California HST System are planned. Phase 1 will connect San Francisco to Los Angeles via the Pacheco Pass and the Central Valley. An expected express trip time between San Francisco and Los Angeles is mandated to be 2 hours and 40 minutes or less. Phase 2 will connect the Central Valley to the state's capital, Sacramento, and will extend the system from Los Angeles to San Diego.

The California HST System will be planned, designed, constructed, and operated under the direction of the California High-Speed Rail Authority (Authority), a state governing board formed in 1996. The Authority's statutory mandate is to develop a high-speed rail system that is coordinated with the state's existing transportation network, which includes intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways, and airports.

Definition of HST System

The system that includes the HST tracks, structures, stations, traction powered substations, and maintenance facilities and train vehicles able to travel 220 mph.

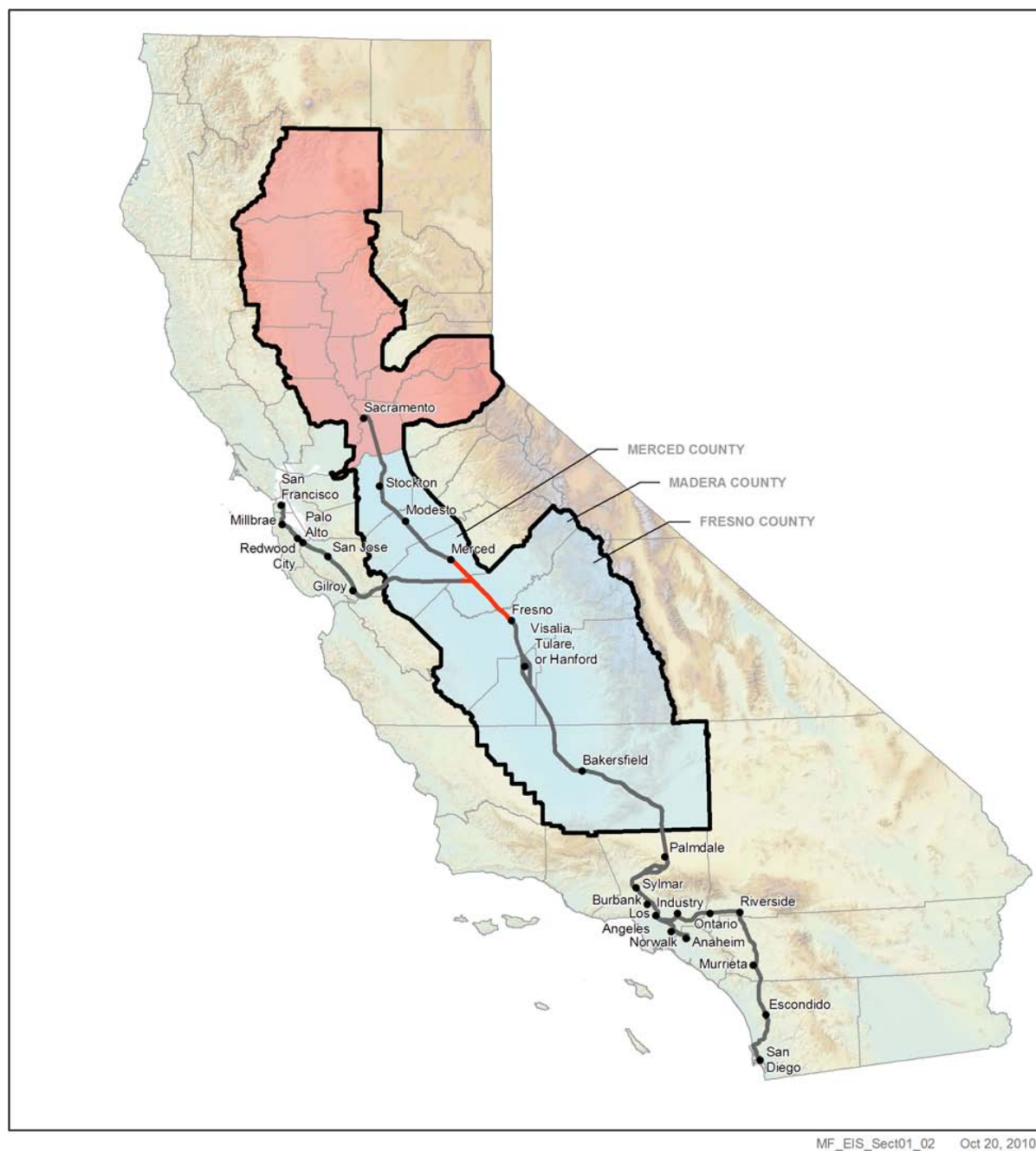
The Merced to Fresno HST Section is a critical Phase 1 link connecting the Bay Area HST sections to the Fresno to Bakersfield, Bakersfield to Palmdale, and Palmdale to Los Angeles HST sections. The Merced to Fresno Section alternatives originated in two program EIR/EIS documents. The Authority and the Federal Railroad Administration (FRA) prepared the 2005 *Final Program EIR/EIS for the Proposed California High-Speed Train System EIR/EIS* (Statewide Program EIR/EIS) and the 2008 *Bay Area to Central Valley HST Final Program EIR/EIS* (Bay Area to Central Valley Program EIR/EIS) to evaluate the ability of an HST system to meet the existing and future capacity demands on California's intercity transportation system and to identify a preferred alignment for the San Francisco Bay Area (Bay Area) to Central Valley sections of the HST System, respectively.

This critical link requires the development of study areas for to evaluate existing conditions and potential impacts on special-status plant species. These study areas are defined with the following basic parameters:

- The potential area of disturbance or construction footprint, encompassing the required right-of-way, as described in Section 2, and areas required for construction, including staging areas and temporary construction easements.
- A special-status plant species buffer for evaluation of indirect impacts.

The Merced to Fresno Section HST Project EIR/EIS will identify and evaluate reasonable and feasible site-specific alignment alternatives and the potential impacts of construction, operation, and maintenance of the HST system (including track, stations, and ancillary facilities) along the alternative alignments. The EIR/EIS will help the Authority and the FRA assess the site characteristics, size, nature, and timing of the proposed project-specific components and help determine whether the impacts are potentially significant and whether the impacts can be avoided or mitigated.

The purpose of this Special-Status Plant Report is to identify and document known and potential occurrences and evaluate potential impacts on habitat for rare, threatened, and endangered plant species along the proposed Merced to Fresno Section of the HST system. The information presented in this report is based on the best available background information as well as field surveys conducted in March, April, and May 2011.



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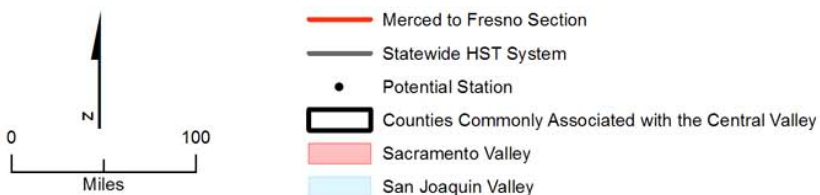


Figure 1-1
California HST System

2.0 Project Description

The purpose of the Merced to Fresno Section of the HST project is to implement the California HST System between Merced and Fresno, providing the public with electric-powered high-speed rail service that provides predictable and consistent travel times between major urban centers and connectivity to airports, mass transit systems, and the highway network in the south San Joaquin Valley, and to connect the northern and southern portions of the HST System. The approximately 65-mile-long corridor between Merced and Fresno is an essential part of the statewide HST System. The Merced to Fresno Section is the location where the HST would intersect and connect with the Bay Area and Sacramento branches of the HST System; it would provide a potential location for the heavy maintenance facility (HMF) where the HSTs would be assembled and maintained, as well as a test track for the trains; it would also provide Merced and Fresno access to a new transportation mode and would contribute to increased mobility throughout California.

2.1 No Project Alternative

The No Project Alternative refers to the projected growth planned for the region through the 2035 time horizon without the HST project and serves as a basis of comparison for environmental analysis of the HST build alternatives. The No Project Alternative includes planned improvements to the highway, aviation, conventional passenger rail, and freight rail systems in the Merced to Fresno project area. There are many environmental impacts that would result under the No Project Alternative.

2.2 High-Speed Train Alternatives

As shown in Figure 2-1, there are three HST alignment alternatives proposed for the Merced to Fresno Section of the HST System: the UPRR/SR 99 Alternative, which would primarily parallel the UPRR railway; the BNSF Alternative, which would parallel the BNSF railway for a portion of the distance between Merced and Fresno; and the Hybrid Alternative, which combines features of the UPRR/SR 99 and BNSF alternatives. In addition, there is an HST station proposed for both the City of Merced and the City of Fresno, there is a wye connection (see text box on page 2-3) west to the Bay Area, and there are five potential sites for a proposed HMF.

2.2.1 UPRR/SR 99 Alternative

This section describes the UPRR/SR 99 Alternative, including the Chowchilla design options, wyes, and HST stations.

2.2.1.1 North-South Alignment

The north-south alignment of the UPRR/SR 99 Alternative would begin at the HST station in Downtown Merced, located on the west side of the UPRR right-of-way. South of the station and leaving Downtown Merced, the alternative would be at-grade and cross under SR 99. Approaching the City of Chowchilla, the UPRR/SR 99 Alternative has two design options: the East Chowchilla design option, which would pass Chowchilla on the east side of town, and the West Chowchilla design option, which would pass Chowchilla 3 to 4 miles west of the city before turning back to rejoin the UPRR/SR 99 transportation corridor. These design options would take the following routes:

- **East Chowchilla design option:** This design option would transition from the west side of the UPRR/SR 99 corridor to an elevated structure as it crosses the UPRR railway and N Chowchilla Boulevard just north of Avenue 27, continuing on an elevated structure away from the UPRR corridor along the west side of and parallel to SR 99 to cross Berenda Slough. Toward the south side of Chowchilla, this design option would cross over SR 99 north of the SR 99/SR 152 interchange near Avenue 23½ south of Chowchilla. Continuing south on the east side of SR 99 and the UPRR corridor, this design option would remain elevated for 7.1 miles through the communities of

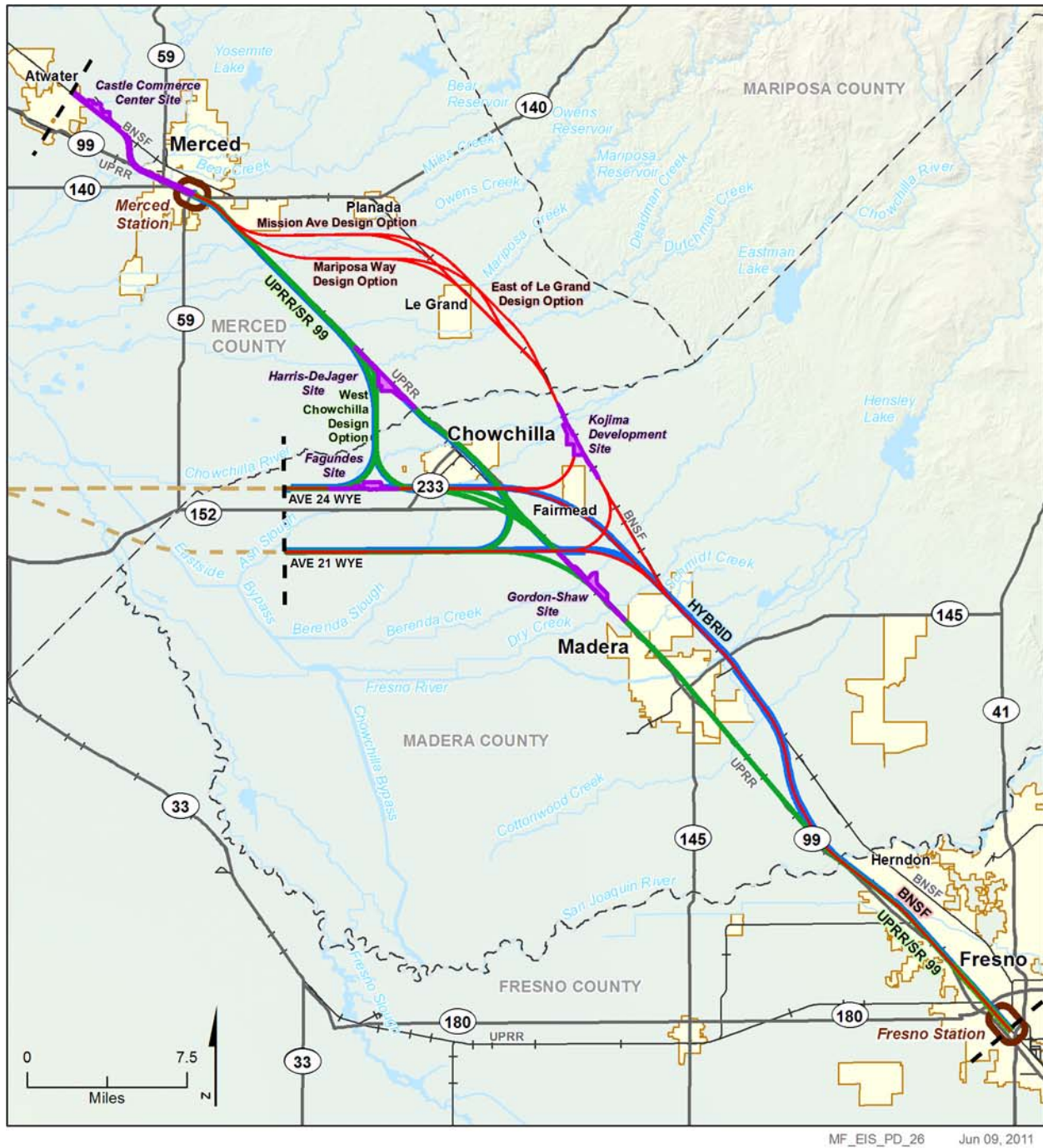


Figure 2-1
Merced to Fresno Section
HST Alternatives

Fairmead and Berenda until reaching the Dry Creek Crossing. The East Chowchilla design option connects to the HST sections to the west via either the Ave 24 or Ave 21 wyes (described below).

- West Chowchilla design option:** This design option would travel due south from Sandy Mush Road north of Chowchilla, following the west side of Road 11¾. The alignment would turn southeast toward the UPRR/SR 99 corridor south of Chowchilla. The West Chowchilla design option would cross over the UPRR and SR 99 east of the Fairmead city limits to again parallel the UPRR/SR 99 corridor. The West Chowchilla design option would result in a net decrease of approximately 13 miles of track for the HST System compared to the East Chowchilla design option and would remain outside the limits of the City of Chowchilla. The West Chowchilla design option connects to the HST sections to the west via the Ave 24 Wye, but not the Ave 21 Wye.

The UPRR/SR 99 Alternative would continue toward Madera along the east side of the UPRR south of Dry Creek and remain on an elevated profile for 8.9 miles through Madera. After crossing over Cottonwood Creek and Avenue 12, the HST alignment would transition to an at-grade profile and continue to be at-grade until north of the San Joaquin River. After the alternative crosses the San Joaquin River, it would rise over the UPRR railway on an elevated guideway, supported by straddle bents, before crossing over the existing Herndon Avenue and again descending into an at-grade profile and continuing west of and parallel to the UPRR right-of-way. After elevating to cross the UPRR railway on the southern bank of the San Joaquin River, south of Herndon Avenue, the alternative would transition from an elevated to an at-grade profile. Traveling south from Golden State Boulevard at-grade, the alternative would cross under the reconstructed Ashlan Avenue and Clinton Avenue overhead structures. Advancing south from Clinton Avenue between Clinton Avenue and Belmont Avenue, the HST guideway would run at-grade adjacent to the western boundary of the UPRR right-of-way and then enter the HST station in Downtown Fresno. The HST guideway would descend in a retained-cut to pass under the San Joaquin Valley Railroad spur line and SR 180, transition back to at-grade before Stanislaus Street, and continue to be at-grade into the station. As part of a station design option, Tulare Street would become either an overpass or undercrossing at the station.

2.2.1.2 Wye Design Options

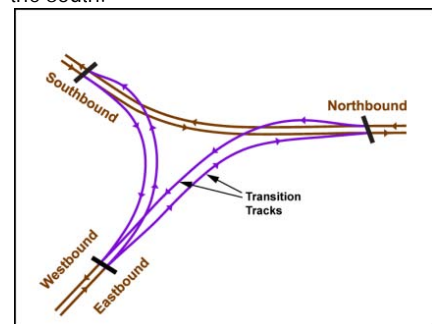
The following text describes the wye connection from the San Jose to Merced Section to the Merced to Fresno Section. There are two variations of the Ave 24 Wye for the UPRR/SR 99 Alternative because of the West Chowchilla design option. The Ave 21 Wye does not connect to the West Chowchilla design option and therefore does not have a variation.

Ave 24 Wye

The Ave 24 Wye design option would travel along the south side of eastbound Avenue 24 toward the UPRR/SR 99 Alternative and would begin diverging onto two sets of tracks west of Road 11 and west of the City of Chowchilla. Under the East Chowchilla design option, the northbound set of tracks would travel northeast across Road 12, joining the UPRR/SR 99 north-south alignment on the west side of the UPRR right-of-way just north of Sandy Mush Road. Under the West Chowchilla design option, the northbound set of tracks would travel northeast across Road 12 and would join the UPRR/SR 99 north-south alignment just south of Avenue 26. The southbound HST guideway would continue east along Avenue 24, turning south near SR 233 southeast of Chowchilla, crossing SR 99 and the UPRR railway to connect to the UPRR/SR 99 Alternative north-south alignment on the east side of the UPRR near Avenue 21½. Under the West Chowchilla design option, the southbound tracks would turn south near Road

What is a "Wye"?

The word "wye" refers to the "Y"-like formation that is created where train tracks branch off the mainline to continue in different directions. The transition to a wye requires splitting two tracks into four tracks that cross over one another before the wye "legs" can diverge in opposite directions to allow bidirectional travel. For the Merced to Fresno Section of the HST System, the two tracks traveling east-west from the San Jose to Merced Section must become four tracks—a set of two tracks branching to the north and a set of two tracks branching to the south.



16 south of Chowchilla, crossing SR 99 and the UPRR to connect to the UPRR/SR 99 north-south alignment on the east side of the UPRR adjacent to the city limits of Fairmead.

Figure 2-2a shows the wye alignment for the East Chowchilla design option and Figure 2-2b shows the alignment for the West Chowchilla design option. Together, the figures illustrate the difference in the wye triangle formation for each design option connection. The north-south alignment of the West Chowchilla design option between Merced and Fresno diverges along Avenue 24 onto Road 12, on the north branch of the wye, allowing the HST alternative to avoid traveling through Chowchilla and to avoid constraining the city within the wye triangle.

Ave 21 Wye

The Ave 21 Wye would travel along the north side of Avenue 21. Just west of Road 16, the HST tracks would diverge north and south to connect to the UPRR/SR 99 Alternative, with the north leg of the wye joining the north-south alignment at Avenue 23½ and the south leg at Avenue 19½.

2.2.1.3 HST Stations

The Downtown Merced and Downtown Fresno station areas would each occupy several blocks, to include station plazas, drop-offs, a multimodal transit center, and parking structures. The areas would include the station platform and associated building and access structure, as well as lengths of platform tracks to accommodate local and express service at the stations. As currently proposed, both the Downtown Merced and Downtown Fresno stations would be at-grade, including all trackway and platforms, passenger services and concessions, and back-of-house functions.

Downtown Merced Station

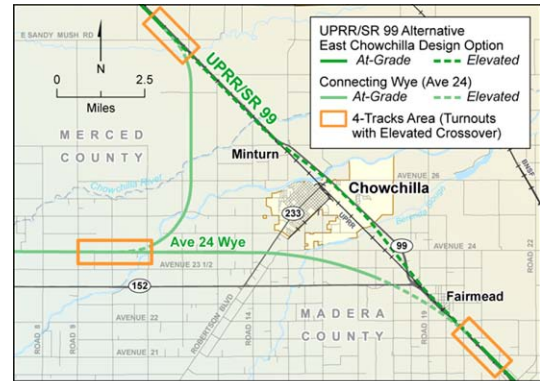
The Downtown Merced Station would be between Martin Luther King Jr. Way to the northwest and G Street to the southeast. The station would be accessible from both sides of the UPRR, but the primary station house would front 16th Street. The major access points from SR 99 include V Street, R Street, Martin Luther King Jr. Way, and G Street. Primary access to the parking facility would be from West 15th Street and West 14th Street, just one block east of SR 99. The closest access to the parking facility from the SR 99 freeway would be R Street, which has a full interchange with the freeway. The site proposal includes a parking structure that would have the potential for up to 6 levels with a capacity of approximately 2,250 cars and an approximate height of 50 feet.

Downtown Fresno Station Alternatives

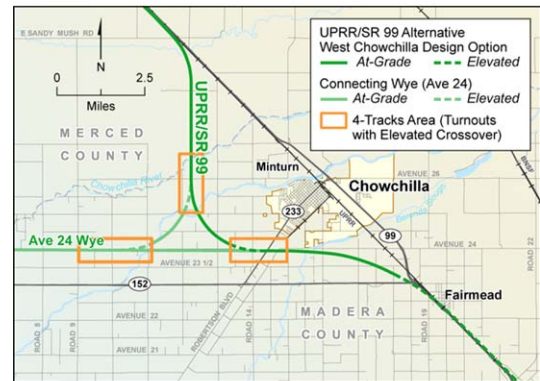
There are two station alternatives under consideration in Fresno: the Mariposa Street Station Alternative and the Kern Street Station Alternative.

Mariposa Street Station Alternative

The Mariposa Street Station Alternative is located in Downtown Fresno, less than 0.5 mile east of SR 99. The station would be centered on Mariposa Street and bordered by Fresno Street on the north, Tulare



(a) Ave 24 Wye with the East Chowchilla Design Option



(b) Ave 24 Wye with the West Chowchilla Design Option

Figures 2-2a and b
Ave 24 Wye and Chowchilla Design Options

Street on the south, H Street on the east, and G Street on the west. The station building would be approximately 75,000 square feet, with a maximum height of approximately 60 feet. The two-level station would be at-grade, with passenger access provided both east and west of the HST guideway and the UPRR tracks, which would run parallel with one another adjacent to the station. Entrances would be located at both G and H Streets. The eastern entrance would be at the intersection of H Street and Mariposa Street, with platform access provided via the pedestrian overcrossing. The main western entrance would be located at G Street and Mariposa Street.

The majority of station facilities would be located east of the UPRR tracks. The station and associated facilities would occupy approximately 18.5 acres, including 13 acres dedicated to the station, bus transit center, surface parking lots, and kiss-and-ride accommodations. A new intermodal facility would be included in the station footprint on the parcel bordered by Fresno Street to the north, Mariposa Street to the south, Broadway Street to the east, and H Street to the west. The site proposal includes the potential for up to 3 parking structures occupying a total of 5.5 acres. Two of the three potential parking structures would each sit on 2 acres, and each would have a capacity of approximately 1,500 cars. The third parking structure would have a slightly smaller footprint (1.5 acres), with 5 levels and a capacity of approximately 1,100 cars. Surface parking lots would provide approximately 300 additional parking spaces.

Kern Street Station Alternative

The Kern Street Station Alternative for the HST station would also be in Downtown Fresno and would be centered on Kern Street between Tulare Street and Inyo Street. This station would include the same components and acreage as the Mariposa Street Station Alternative, but the station would not encroach on the historic Southern Pacific Railroad depot just north of Tulare Street and would not require relocation of existing Greyhound facilities. Two of the 3 potential parking structures would each sit on 2 acres and each would have a capacity of approximately 1,500 cars. The third structure would have a slightly smaller footprint (1.5 acres) and a capacity of approximately 1,100 cars. Like the Mariposa Street Station Alternative, the majority of station facilities under the Kern Street Station Alternative would be east of the HST tracks.

2.2.2 BNSF Alternative

This section describes the BNSF Alternative, including the Le Grand design options and wyes. It does not include a discussion of the HST stations, because the station descriptions are identical for each of the three HST alignment alternatives.

2.2.2.1 North-South Alignment

The north-south alignment of the BNSF Alternative would begin at the proposed Downtown Merced Station. This alternative would remain at-grade through Merced and would cross under SR 99 at the south end of the city. Just south of the interchange at SR 99 and E Childs Avenue, the BNSF Alternative would cross over SR 99 and UPRR as it begins to curve to the east, crossing over the E Mission Avenue interchange. It would then travel east to the vicinity of Le Grand, where it would turn south and travel adjacent to the BNSF tracks.

To minimize impacts on the natural environment and the community of Le Grand, the project design includes four design options:

- **Mission Ave design option:** This design option would turn east to travel along the north side of Mission Avenue at Le Grand and then would elevate through Le Grand adjacent to and along the west side of the BNSF corridor.
- **Mission Ave East of Le Grand design option:** This design option would vary from the Mission Ave design option by traveling approximately 1 mile farther east before turning southeast to cross Santa Fe Avenue and the BNSF tracks south of Mission Avenue. The HST alignment would parallel the BNSF for a half-mile to the east, avoiding the urban limits of Le Grand. This design option would

cross Santa Fe Avenue and the BNSF railroad again approximately one-half mile north of Marguerite Road and would continue adjacent to the west side of the BNSF corridor.

- **Mariposa Way design option:** This design option would travel 1 mile farther than the Mission Ave design option before crossing SR 99 near Vassar Road and turning east toward Le Grand along the south side of Mariposa Way. East of Simonson Road, the HST alignment would turn to the southeast. Just prior to Savana Road in Le Grand, the HST alignment would transition from at-grade to elevated to pass through Le Grand on a 1.7-mile-long guideway adjacent to and along the west side of the BNSF corridor.
- **Mariposa Way East of Le Grand design option:** This design option would vary from the Mariposa Way design option by traveling approximately 1 mile farther east before turning southeast to cross Santa Fe Avenue and the BNSF tracks less than one-half mile south of Mariposa Way. The HST alignment would parallel the BNSF to the east of the railway for a half-mile, avoiding the urban limits of Le Grand. This design option would cross Santa Fe Avenue and the BNSF again approximately a half-mile north of Marguerite Road and would continue adjacent to the west side of the BNSF corridor.

Continuing southeast along the west side of BNSF, the BNSF Alternative would begin to curve just before Plainsburg Road through a predominantly rural and agricultural area. One mile south of Le Grand, the HST alignment would cross Deadman and Dutchman creeks. The alignment would deviate from the BNSF corridor just southeast of S White Rock Road, where it would remain at-grade for another 7 miles, except at the bridge crossings, and would continue on the west side of the BNSF corridor through the community of Sharon. The HST alignment would continue at-grade through the community of Kismet until crossing at Dry Creek. The BNSF Alternative would then continue at-grade through agricultural areas along the west side of the BNSF corridor through the community of Madera Acres north of the City of Madera. South of Avenue 15 east of Madera, the alignment would transition toward the UPRR corridor, following the east side of the UPRR corridor near Avenue 9 south of Madera, then continuing along nearly the same route as the UPRR/SR 99 Alternative over the San Joaquin River to enter the community of Herndon. After crossing the San Joaquin River, the alignment would be the same as for the UPRR/SR 99 Alternative.

2.2.2.2 Wye Design Options

The Ave 24 Wye and the Ave 21 Wye would be the same as described for the UPRR/SR 99 Alternative (East Chowchilla design option), except as noted below.

Ave 24 Wye

As with the UPRR/SR 99 Alternative, the Ave 24 Wye would follow along the south side of Avenue 24 and would begin diverging into two sets of tracks (i.e., four tracks) beginning west of Road 17. Two tracks would travel north near Road 20½, where they would join the north-south alignment of the BNSF Alternative on the west side of the BNSF corridor near Avenue 26½. The two southbound tracks would join the BNSF Alternative on the west side of the BNSF corridor south of Avenue 21.

Ave 21 Wye

As with the UPRR/SR 99 Alternative, the Ave 21 Wye would travel along the north side of Avenue 21. Two tracks would diverge, turning north and south to connect to the north-south alignment of the BNSF Alternative just west of Road 21. The north leg of the wye would join the north-south alignment just south of Avenue 24 and the south leg would join the north-south alignment just east of Frontage Road/Road 26 north of the community of Madera Acres.

2.2.3 Hybrid Alternative

This section describes the Hybrid Alternative, which generally follows the alignment of the UPRR/SR 99 Alternative in the north and the BNSF Alternative in the south. It does not include a discussion of the HST stations because the station descriptions are identical for each of the three HST alternatives.

2.2.3.1 North-South Alignment

From north to south, generally, the Hybrid Alternative would follow the UPRR/SR 99 alignment with either the West Chowchilla design option with the Ave 24 Wye or the East Chowchilla design option with the Ave 21 Wye. Approaching the Chowchilla city limits, the Hybrid Alternative would follow one of two options:

- In conjunction with the Ave 24 Wye, the HST alignment would veer due south from Sandy Mush Road along a curve and would continue at-grade for 4 miles parallel to and on the west side of Road 11¾. The Hybrid Alternative would then curve to a corridor on the south side of Avenue 24 and would travel parallel for the next 4.3 miles. Along this curve, the southbound HST track would become an elevated structure for approximately 9,000 feet to cross over the Ave 24 Wye connection tracks and Ash Slough, while the northbound HST track would remain at-grade. Continuing east on the south side of Avenue 24, the HST alignment would become identical to the Ave 24 Wye connection for the BNSF Alternative and would follow the alignment of the BNSF Alternative until Madera.
- In conjunction with the Ave 21 Wye connection, the HST alignment would transition from the west side of UPRR and SR 99 to an elevated structure as it crosses the UPRR and N Chowchilla Boulevard just north of Avenue 27, continuing on an elevated structure along the west side of and parallel to SR 99 away from the UPRR corridor while it crosses Berenda Slough. Toward the south side of Chowchilla, the alignment (with the Ave 21 Wye) would cross over SR 99 north of the SR 99/SR 152 interchange near Avenue 23½ south of Chowchilla. It would continue to follow along the east side of SR 99 until reaching Avenue 21, where it would curve east and run parallel to Avenue 21, briefly. The alignment would then follow a path similar to the Ave 21 Wye connection for the BNSF Alternative, but with a tighter 220 mph curve. The alternative would then follow the BNSF Alternative alignment until Madera.

Through Madera and until reaching the San Joaquin River, the Hybrid Alternative is the same as the BNSF Alternative. Once crossing the San Joaquin River, the alignment of the Hybrid Alternative becomes the same as for the UPRR/SR 99 Alternative.

2.2.3.2 Wye Design Options

The wye connections for the Hybrid Alternative follow Avenue 24 and Avenue 21, similar to those of the UPRR/SR 99 and BNSF alternatives.

Ave 24 Wye

The Ave 24 Wye is the same as the combination of the UPRR/SR 99 Alternative with the West Chowchilla design option, and the Ave 24 Wye for the BNSF Alternative.

Ave 21 Wye

The Ave 21 Wye is similar to the combination of the UPRR/SR 99 Alternative with the Ave 21 Wye on the northbound leg and the BNSF Alternative with the Ave 21 Wye on the southbound leg. However, the south leg under the Hybrid Alternative would follow a tighter, 220 mph curve than the BNSF Alternative, which follows a 250 mph curve.

2.2.4 Heavy Maintenance Facility Alternatives

The Authority is studying five HMF sites (see Figure 2-1) within the Merced to Fresno Section, one of which may be selected.

- **Castle Commerce Center HMF site** – A 370-acre site located 6 miles northwest of Merced, at the former Castle Air Force Base in northern unincorporated Merced County. It is adjacent to and on the east side of the BNSF mainline, 1.75 miles south of the UPRR mainline, off of Santa Fe Drive and Shuttle Road, 2.75 miles from the existing SR 99 interchange. The Castle Commerce Center HMF would be accessible by all HST alternatives.
- **Harris-DeJager HMF site** – A 401-acre site located north of Chowchilla adjacent to and on the west side of the UPRR corridor, along S Vista Road and near the SR 99 interchange under construction. The Harris-DeJager HMF would be accessible by the UPRR/SR 99 and Hybrid alternatives if coming from the Ave 21 Wye and the UPRR/SR 99 Alternative with the East Chowchilla design option and the Ave 24 Wye.
- **Fagundes HMF site** – A 231-acre site, located 3 miles southwest of Chowchilla on the north side of SR 152, between Road 11 and Road 12. This HMF would be accessible by all HST alternatives with the Ave 24 Wye.
- **Gordon-Shaw HMF site** – A 364-acre site adjacent to and on the east side of the UPRR corridor, extending from north of Berenda Boulevard to Avenue 19. The Gordon-Shaw HMF would be accessible from the UPRR/SR 99 Alternative.
- **Kojima Development HMF site** – A 392-acre site on the west side of the BNSF corridor east of Chowchilla, located along Santa Fe Drive and Robertson Boulevard (Avenue 26). The Kojima Development HMF would be accessible by the BNSF Alternative with the Ave 21 Wye.

3.0 Methods

This section describes the methods used to conduct special-status plant surveys for the Merced to Fresno Section of the California HST. All of the biological surveys conducted for the Merced to Fresno Section, the San Jose to Merced Section, and the Fresno to Bakersfield Section of the California HST Program are intended to have conforming methodologies for evaluating potential impacts on biological resources and wetlands throughout the entire HST System. These methods are detailed in the *High Speed Train Protocol Special-Status Plant Surveys Work Plan* (AECOM 2011) and are summarized below.

The survey purpose was to determine the presence or absence of special-status plant species within the limits of disturbance of the affected parcels associated with the Merced to Fresno High Speed Train Alignment and Alternatives (special-status plant species study area). Parcels identified to contain suitable habitat for special-status species were surveyed in pedestrian transect surveys where property access was available.

3.1 Study Areas

The following study areas were established for evaluating special-status plants:

- Special-status plant study area – Construction footprint plus a 100-foot-radius buffer around project elements to evaluate direct and indirect impacts on special-status plant species.
- Regional area – The regional area was developed for purposes of prefield investigations and general discussion of special-status species in the vicinity of the Merced to Fresno Section of the HST system. The regional area includes a broad area covering approximately 2,688 square miles of the San Joaquin Valley, centered on the proposed HST alignment. The regional area includes the 15 U.S. Geological Survey (USGS) quadrangles that intersect the proposed Merced to Fresno Section alignment and their surrounding USGS quadrangles, for a total of 45 quadrangles. A complete description of the regional area is provided in the Biological Resources and Wetlands Technical Report (Authority and FRA 2011b).

These study areas are discussed in more detail below.

3.2 Prefield Investigation Methods

Prior to performing field surveys, study areas for special-status species habitat were established and existing background information was reviewed to develop survey plans for special-status plant communities and special-status plant species.

3.2.1 Regional Area

The regional area includes a broad, approximately 2,688-square-mile (69,618,880-acre) area of the San Joaquin Valley, centered on the proposed HST alternatives, which considers the potential presence, connection, and movement of biological resources within and among suitable habitats within the region. Starting the analysis with this regional focus allowed for a conservative approach to distinguish between those habitats, species, and resources that have potential to be affected by the proposed activities and those that do not. The results of prefield evaluations of the regional area were considered in determining which resources to evaluate through field studies for potential to be affected by the project.

In this report, the regional area primarily refers to an area described by 45 United States Geologic Survey (USGS) 7.5-minute quadrangles (quads), which includes the 15 quads that overlap with the HST alternatives and the 30 adjacent quads. USFWS, California Natural Diversity Database (CNDDDB), and CNPS database queries for prefield investigations included the following 45 quads: Arena, Atwater, Berenda, Biola, Bliss Ranch, Bonita Ranch, Caruthers, Chowchilla, Clovis, Conjeo, Cressey, Daulton, El Nido, Firebaugh NE, Fresno North, Fresno South, Friant, Gravelly Ford, Gregg, Haystack Mountain,

Herndon, Illinois Hill, Indian Gulch, Kearney Park, Kerman, Kismet, Lanes Bridge, Le Grand, Little Table Mountain, Madera, Malaga, Merced, Owens Reservoir, Oxalis, Plainsburg, Planada, Poso Farm, Raisin, Raymond, Raynor Creek, Sandy Mush, Santa Rita Bridge, Turner Ranch, Winton, and Yosemite Lake.

In order to generate a regular polygon for querying certain spatial databases, such as the CNDDDB RareFind 3 Geographic Information System (GIS) data, the area within 10 miles of the alignment centerline was used instead of the 45-quad area. Small areas of the Turlock Lake, Turlock, Stevinson, and Delta Ranch quads are within this 10-mile area but are beyond the 45-quad area described above; therefore, these four quads were not included in quad-based database queries. The regional area is illustrated on Figure 3-1.

Since initiation of the project, the alignments of the alternatives have changed slightly but remained within the originally defined regional area. The regional area and database queries have been updated.

3.2.2 Special-Status Plant Study Area

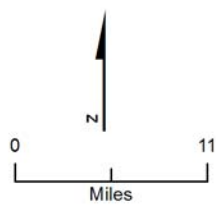
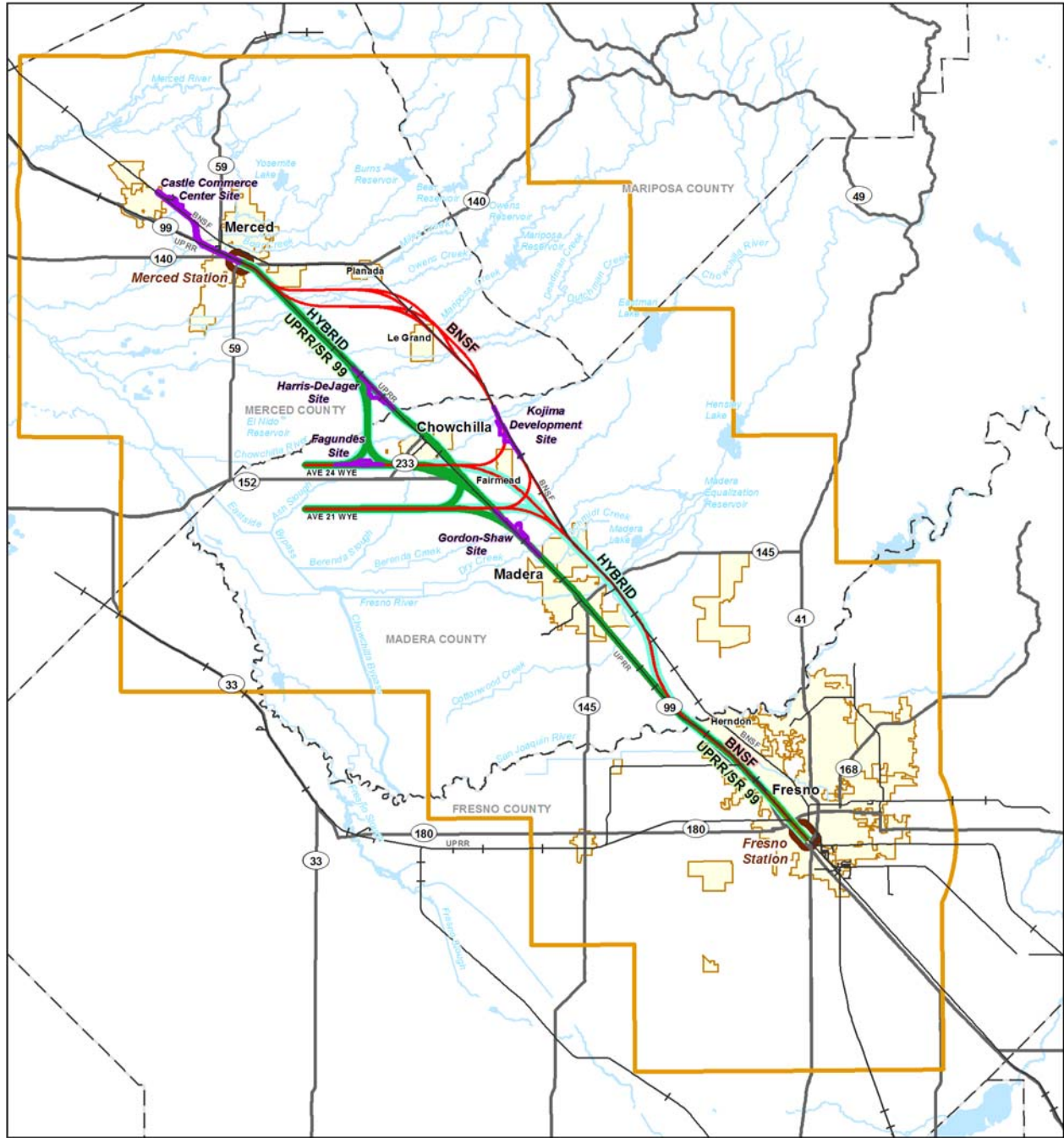
The special-status plant study area includes the limits of disturbance (i.e., the construction footprint) plus a 100-foot-radius buffer for the proposed project components, as described in Section 2. Focused special-status plant surveys were conducted within the special-status plant study area, consisting of an area approximately 15,000 acres in size.

3.2.3 Prefield Survey Investigations

Prior to field surveys, a preliminary list of potential special-status plants that have the potential to occur in the study area and are documented in the regional area of the Merced to Fresno Section of the HST were identified through a query of existing databases and agency information. The following sources were used:

- U.S. Fish and Wildlife Service, Sacramento Field Office website – official list of federal candidate, proposed, threatened, and endangered plant species having the potential to occur in the study area; generated on September 28 and October 5, 2009 (USFWS 2009), and on June 17, 2010 (USFWS 2010).
- California Natural Diversity Database (RareFind Version 3) – database query of special-status plant species and sensitive natural communities reported in the project area; generated on October 1, 2009 (CNDDDB 2003a), June 17, 2010 (CNDDDB 2003b), and March 15, 2011 (CNDDDB 2003c). Query included the 45 USGS quadrangles as well as all reported occurrences of special-status plants and sensitive natural communities within a 10-mile radius of the Merced to Fresno Section alternatives.
- California Native Plant Society's Online Inventory of Rare and Endangered Plants of California list of special-status plant species that may occur in the project area; generated on October 1, 2009 (CNPS 2009) and June 17, 2010 (CNPS 2010).

For each species identified as having a moderate to high potential to occur in the study area, phenological data and photographs were compiled in a field guide booklet for each team member. Specific information within the field booklet discusses conservation status, distribution, life cycles, habitat requirements, regional occurrence(s), representative photographs, and species keys. This information was referenced from the CNDDDB data, individual species treatments from *Jepson Manual of Higher Plants of California* (Hickman 1993) and photographs from the Calphotos Web site.



- UPRR/SR 99 Alternative
- BNSF Alternative
- Hybrid Alternative
- Station Study Area
- Potential Heavy Maintenance Facility
- City Limit
- - - County Boundary
- + + Railroad
- Regional Area

Figure 3-1
Regional Area Map

3.2.5 Definition of Special-Status Plant Species

Special-status species are plants that are legally protected under the federal Endangered Species Act (ESA), California Endangered Species Act (CESA), and/or other regulations, as well as species considered rare by the scientific community because of a documented or perceived decline or limitation of population size or geographical extent. Special-status species include the following:

- Species listed or proposed for listing as threatened or endangered under the federal ESA (50 Code of Federal Regulations [CFR] 17.12 [listed plants]); 50 CFR 17.11 [listed animals]; various notices in the Federal Register [FR] [proposed species]].
- Species that are candidates for possible future listing as threatened or endangered under the federal ESA (73 FR 75176, December 10, 2008).
- Species listed or proposed for listing by the State of California as threatened or endangered under CESA (14 California Code of Regulations [CCR] 670.5).
- Species that meet the definitions of rare or endangered under California Environmental Quality Act [CEQA] Guidelines Section 15380 and 151250).
- Plants presumed by the California Native Plant Society (CNPS) to be “extinct in California” (Lists 1A, CNPS 2009).
- Plants considered by the CNPS to be “rare, threatened, or endangered in California” (Lists 1B and 2, CNPS 2009).
- Plants listed by CNPS as plants about which more information is needed to determine their status (List 3, CNPS 2009), which may be included as special-status species on the basis of local significance or recent biological information.
- Plant species listed as rare under the California Native Plant Protection Act (California Fish and Game Code [CFGCA] 1900 et seq.).

3.2.6 Special-Status Plant Species Occurrence Potential

Habitat types identified during the reconnaissance-level field assessments were compared against the known habitat requirements for each special-status plant species with potential to occur in the regional area. The potential for a particular special-status species to occur within the special-status plant species study area was then assessed and ranked as either no potential, future potential, unlikely potential, low potential, moderate potential, or high potential. Species determined to have no potential to occur or that are unlikely to occur in the study area are not discussed further in this report. Definitions for “potential” are provided below. Species with future, low, moderate, or high potential to occur in the special-status plant species study area are discussed in Section 5.

3.2.6.1 No Potential

Special-status plant species with no potential to occur include those with no current or historic range in the special-status plant species study area and those with no habitat present in the special-status plant species study area.

3.2.6.2 Unlikely Potential

Special-status plant species with an unlikely potential to occur in the special-status plant species study area include those reported to have a current or historic range in the regional area but either (a) have no potentially suitable habitat identified within the special-status plant species study area, (b) are presumed to be extirpated from the special-status plant species study area, or (c) have a current range that is well documented not to include the special-status plant species study area.

3.2.6.3 Low Potential

Special-status plant species with low potential to occur include those with either (a) a potential current range and low or marginal quality (i.e., disturbed, fragmented, or otherwise degraded) habitat identified in the special-status plant species study area, or (b) a potential historic (but not current) range and suitable habitat within the special-status plant species study area.

3.2.6.4 Moderate Potential

Special-status species with moderate potential to occur include those with potential current range and moderate quality habitat in the special-status plant species study area.

3.2.6.5 High Potential

Special-status plant species with high potential to occur include those reported as presumed extant, observed, or otherwise expected (i.e., professional opinion or other documentation) to occur in the special-status plant species study area.

3.3 Reconnaissance-Level Field Survey Methods

The potential for project impacts on special-status plants depends largely on the presence of suitable habitat in and adjacent to areas that would be affected by the project. Reconnaissance-level field surveys involve preliminary data gathering for the purpose of recognizing and identifying resources that warrant additional or more focused surveys. Reconnaissance-level field surveys were conducted to determine the presence or absence of special-status plant species and to document the location of any biological resources through habitat characterization and mapping. All habitat characterization and mapping were done from publicly accessible roads along or near the HST alternatives. The results of these surveys were used to provide background for the special-status plant surveys.

Reconnaissance-level field surveys discussed in this report were conducted on several occasions between March 2009 and July 2010, generally between 7 a.m. and 5 p.m. The following provides brief descriptions of these surveys:

- CH2M HILL biologists Michael Clary and Corinna Lu conducted terrestrial habitat surveys of the UPRR/SR 99 Alternative north-south alignment and the downtown Merced and Fresno stations from November 16 through 20, 2009. Surveys for portions of the Ave 24 Wye were conducted by CH2M HILL biologists Russell Huddleston and Danielle Tannourji. Temperatures during the November 2009 surveys ranged from 30 to 70 degrees Fahrenheit (°F) with light winds and light precipitation on November 20. The primary objective of the November 2009 field surveys was to characterize and map the land use and habitat types within the habitat study area.
- CH2M HILL biologist Michael Clary conducted terrestrial habitat surveys on May 6 and 7, 2010. Temperatures ranged from approximately 36 to 79°F with light winds. The primary objective of these surveys was to map habitat within areas of the UPRR and BNSF alternatives that had shifted subsequent to previous mapping and to map habitat in the BNSF alternative habitat study area, the Ave 24 Wye, and the HMF sites.
- CH2M HILL biologists Michael Clary, Judy Ferguson, and Dave Fornander conducted terrestrial habitat surveys on May 24 through May 26, 2010. Temperatures ranged from approximately 40 to 76°F with moderate winds. The primary objective of these surveys was to map habitat within areas of the UPRR and BNSF alternatives that had shifted subsequent to previous mapping and to map habitat in the BNSF alternative habitat study area, the Ave 24 Wye, and the HMF sites.
- CH2M HILL biologist Michael Clary conducted terrestrial habitat surveys on July 14 through July 16, 2010. Temperatures ranged from approximately 40 to 76°F with moderate winds. The primary objective of these surveys was to map habitat within areas of the HST alternatives that had shifted subsequent to previous mapping and to resolve questions related to earlier field mapping.

Following each reconnaissance-level survey, field verified habitat data were noted on aerial photographs and digitized into the project GIS database.

3.3.1 Special-Status Plant Species Habitat Assessment Mapping

Reconnaissance-level field surveys for the Merced to Fresno Section were conducted using the standardized vegetation community habitat mapping methods described in the *Central Valley Biological Resources and Wetlands Survey Plan* (URS, CH2M HILL, and ICF 2009). These standardized methods have been implemented for the HST project as a whole to maintain consistency in protocols and methods.

Special-status plant species assessments consisted of field surveys to identify and map special-status plant communities, including jurisdictional waters, and potential special-status plant and wildlife habitat, including both terrestrial and aquatic habitats. Communities and habitat were mapped using the plant and wildlife habitat descriptions presented in *A Guide to Wildlife Habitats of California* (California Department of Fish and Game [CDFG] 1988), which are used in the California Wildlife Habitat Information System (CDFG 2009c). Surveys for individual species were not conducted.

Field maps of the special-status plant species study area were created at a scale of 1:4800. The special-status plant species study area was overlaid onto aerial photographs with major roads, geographic features, and other notable landmarks to help orient survey teams and provide a reference for estimating the location of plant and wildlife habitats, special-status resources, and wildlife movement corridors.

Habitat suitability assessments of the special-status plant species study area were conducted from publicly accessible roadways where property access had not been granted. In areas where the special-status plant species study area was not visible from the roadway, biologists used other available resources, including aerial photography, to assess natural communities. In these instances, high-resolution aerial imagery signatures that were continuous between the study area and an accessible roadway were presumed to be consistent. Imagery signatures that were not continuous with an accessible roadway were presumed to match similar nearby signatures.

Special-status plant communities including riparian boundaries were identified and mapped on aerial photographs during the assessments. After field work was completed, hand-drawn locations of plant habitats and observations of special-status species, their key habitat elements, or special plant and notes were digitized and Global Positioning System (GPS)-collected data were downloaded and imported into the GIS database.

The plant habitat assessment consisted of the following activities:

- Mapped special-status plant communities and habitats that may be suitable for special-status plant species.
- Confirmed, identified, and described known or previously unreported suitable plant habitats.
- Mapped special-status plant habitat elements as identified in the prefield investigation.
- Identified and mapped locations of observed special-status plant species.

To identify potential habitat for the 36 special-status plant species identified in the regional area, key habitat constituents were mapped during the reconnaissance-level field surveys including natural and semi-natural habitats, sensitive natural communities, and other terrestrial habitats with potential to provide suitable special-status plant habitat.

3.4 Field Survey Methods

3.4.1 General Survey Guidelines

Field surveys for special-status plants were conducted during the early (March) growing season in accordance with the *CNPS Botanical Survey Guidelines* (CNPS 2001), the *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (USFWS 1996), and the *Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities* (CDFG 2009a). Plant surveys were also conducted in late April and late May because of the lead botanist's evaluation of weather trends and the phenological status of plant populations within the survey area as well as those within the reference sites. Reference sites were used to monitor the phenology of known populations of special-status plants in relation to weather patterns. In addition, where applicable, surveys for the two federally listed species, San Joaquin woolly-threads (*Monolopia congdonii*) and California jewelflower (*Caulanthus californicus*), complied with supplemental guidance provided in *General Rare Plant Survey Guidelines* and the *Supplemental Survey Methods* (Endangered Species Recovery Program 2002).

3.4.2 Field Protocols

3.4.2.1 Survey Area

The special-status plant survey area included parcels where permissions from landowners had been granted for the purpose of conducting biological surveys. The first special-status plant survey (mobilized on March 15, 2011) included access permissions obtained for 100 parcels, comprising a total of 2,751 acres; the second survey (mobilized on April 18, 2011) included access permissions obtained for 106 parcels, comprising a total of 3,238 acres; and the third survey (mobilized on May 24, 2011) included access permissions obtained for 110 parcels, comprising a total of 3,124 acres. These parcels were numbered with their respective Fresno, Madera, or Merced County Assessor's Parcel Number (APN) and depicted for the surveyors on 1:200-scale aerial photographs that were used in the field for orientation and navigation.

3.4.2.2 Field Efforts

Teams walked meandering transects across accessible parcels having suitable habitat for the special-status plants. Survey transects were spaced at 15- to 50-foot intervals, depending upon the habitat type, existing vegetation, plant cover, and structural complexity. Where the onsite habitat type was determined to be suitable and likely to support special-status species, surveyors and intervals were closer together. These areas were typically fields and/or grasslands supporting vernal pools and/or areas where microhabitat for special-status plant species occurred (e.g., specialized soils such as alkali soils, clay, sand, etc.). Many of the parcels where permission for entry was granted consisted entirely of active agricultural lands (orchards, vineyards, row crops) or urban developed areas that provided limited or no suitable habitat for special-status plants. Botanical surveys in these areas were generally limited to the edges of the fields, orchards, vineyards, drainage ditches, canals, windrows, and roadsides. Completely developed urban residential, commercial, and industrial parcels were not included in the special-status species survey; however, ruderal and disturbed areas were surveyed, as some special-status plant species are known to occur in disturbed soils. The California Department of Transportation (Caltrans), BNSF, and UPRR rights-of-way were not surveyed because of encroachment permit requirements. Qualifications of field staff for the March, April, and May 2011 surveys are provided in Appendix C.

March 2011

Special-status plant field surveys were conducted March 15 through March 17, 2011 (24 person days – approximately 192 person hours), for 100 parcels where permission to access had been granted. Four teams of one botanist and one Trimble Mapping and Navigation Specialist completed this phase of the special-status plant field surveys. Surveyors were Virginia Dains, David Charlton, Rocky Brown, Paul Andreano, Robin Murray, Robert Conohan, Bryan Chevillet, and Holly Hill. Environmental conditions varied

daily through the survey period from clear skies to light precipitation. Temperatures ranged widely, from approximately 40 to 70°F, with moderate winds.

April 2011

Special-status plant field surveys were also conducted April 18 through April 21, 2011 (16 person days – approximately 160 person hours), for 106 parcels where permission to access had been granted. Two teams of one botanist and one Trimble Mapping and Navigation Specialist completed this phase of the special-status plant field surveys. Surveyors were Virginia Dains, Robert Conohan, Chris Powers, and Holly Hill. Environmental conditions varied daily through the survey period from clear skies to light precipitation. Temperatures ranged widely, from approximately 40 to 75°F, with light to moderate winds.

May 2011

Special-status plant field surveys were conducted May 24 through May 27, 2011 (14 person days – approximately 168 person hours), for 109 parcels where permission to access had been granted. Two teams of one botanist and one Trimble Mapping and Navigation Specialist completed this phase of the special-status plant field surveys. Surveyors were Virginia Dains, Chris Powers, Bryan Chevillet, and Holly Hill. Environmental conditions throughout the survey period consisted of clear skies. Temperatures ranged widely, from approximately 45 to 85°F, with light to moderate winds.

3.4.2.3 Documentation

Special-status surveys were floristic in nature, meaning that all observed plant species regardless of listing status were identified to the level necessary to determine whether or not the plants observed were a special-status species. Species were identified and recorded according to nomenclature found in the *Jepson Manual of Higher Plants of California* (Hickman 1993) or the most current scientific name per the Jepson On-Line Interchange (UC Berkeley 2010). Species that could not be readily identified in the field were collected and maintained for identification in the office. Appendix F provides a comprehensive list of plant species observed during the surveys.

In addition to maintaining a list of observed plants, survey data collected included location, date, weather, approximate time of day, a general habitat classification, and team member names. Other data include at least one photograph of the area surveyed and a GPS coordinate.

Data collected from surveys for special-status plants and habitats were recorded using Trimble Juno global positioning system (GPS) units and a Pro XH receiver for submeter accuracy. The datum used in the GPS units was the NAD 1983 State Plane California Zone III. GPS units were equipped with 3 megapixel digital cameras for photo documentation, data files for navigation, and data dictionaries for data collection. Project-specific data files included parcel boundary with assessor's parcel number and alternative alignments and project features. Project-specific data dictionaries were developed and used in the field to increase the efficiency of data recording and to increase data quality. All special-status plant, habitat, photographs, and other data collected with GPS units were downloaded and backed up nightly onto laptop computers. GPS data files were transmitted to GIS staff at the completion of plant surveys. Following collection and transfer, GPS data were post-processed by the GIS analysts and downloaded into a project GIS database.

3.4.2.4 Voucher Specimens

Voucher specimens, if taken, included collecting any special-status plant part (root, flowers, and leaves, if possible) observed, as long as a single occurring specimen was not taken or if the voucher specimen did not exceed 10% of the existing population. The specimen collected was pressed in a 9-inch by 12-inch field press with the location noted manually in field notebooks, as well as recorded in the Trimble unit. All rare plants observed in the study area were identified to species or subspecies and photographed.

3.5 Field Conditions and Survey Limitations

Total rainfall within the survey area between October 1, 2010, and February 28, 2011, was at or near average, with 11.5 inches for Fresno (151% of average), 9.8 inches for Merced (132% of average), and 9.8 inches (105% of average) for Madera (California Data Exchange Center [CDEC] 2011). Climate conditions during the survey period were considered to be favorable but cool for rare plant populations.

Potential impacts on special-status plant species along the Merced to Fresno Section have, therefore, been determined, to a large extent, on the basis of identifying suitable habitat within the study area. Identification of suitable habitat was based on field reconnaissance surveys and habitat mapping on aerial photographs.

3.5.1 Reference Sites

Reference sites for the special-status plant survey include the Arena Plains Unit of the San Luis National Wildlife Refuge Complex, Great Valley Grasslands State Park, Pixley Vernal Pool Preserve, the Alkali Sink State Ecological Reserve and the Flying M Ranch. The locations of the reference sites in relation to the special-status plant study area are depicted on Figure 3-2. Appendix B also provides photographs of these reference sites. Using these sites as reference populations serves two purposes: (1) to monitor the phenology and status of special-status plant populations and (2) orient survey team members as necessary with accurate identification characteristics of special-status plant species.

Regular telephone contact was made between February 24 and March 21, 2011, with California State Parks Ranger Joanne Carlton, who reported current conditions and any known special-status plant observations for the season. Survey members Holly Hill and/or Michael Clary visited these sites on several occasions between March 11 and May 23, 2011. The primary goals for site visits were to determine the phenological development of both common and special-status plants for the season and, if possible, photo-document special-status species for reference. The following sections describe the reference sites and pre-survey conditions for special-status plants at each location.

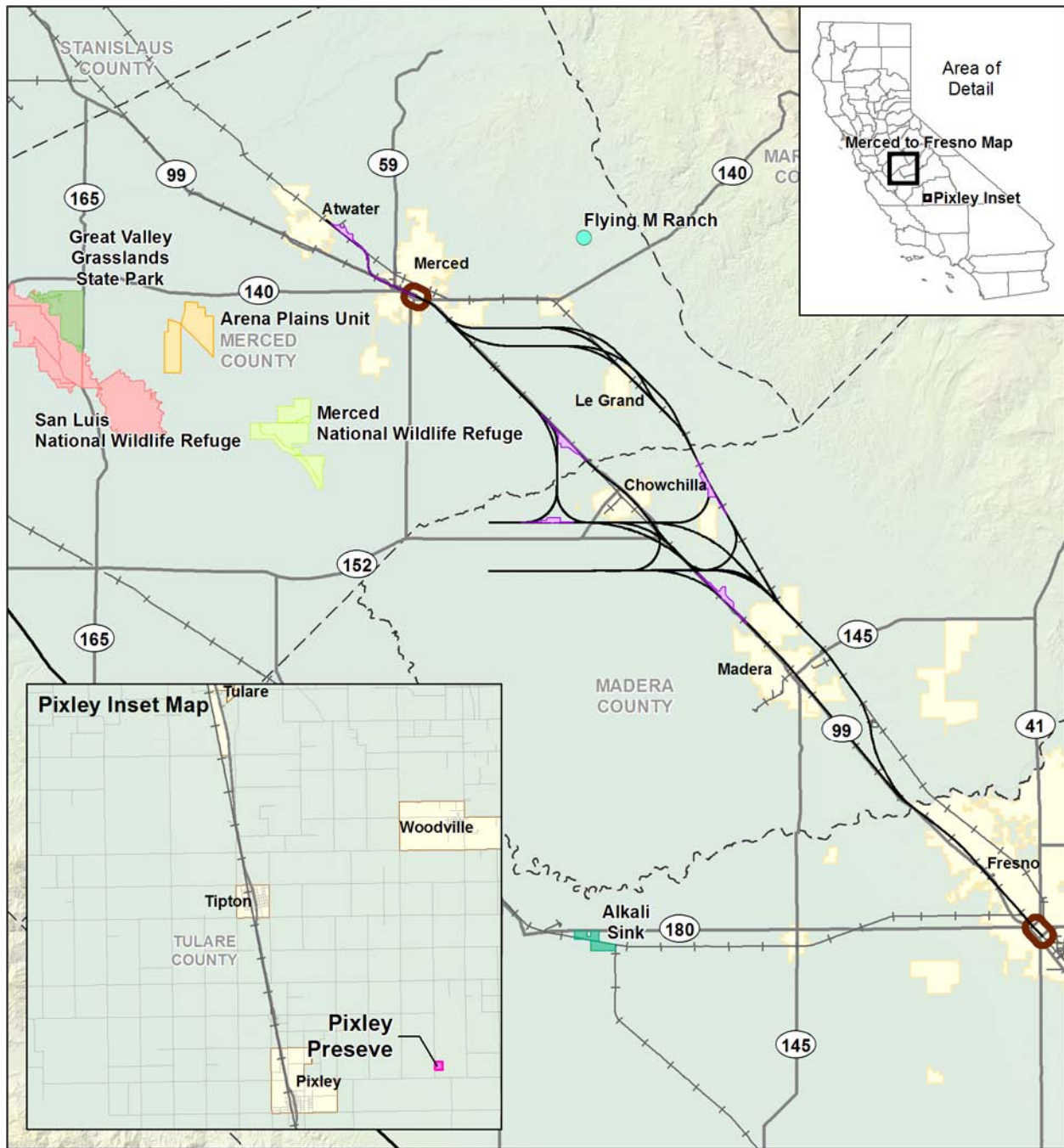
3.5.1.1 U.S. Fish and Wildlife Service San Luis National Wildlife Refuge Complex – Arena Plains Unit

The San Luis Wildlife Refuge Complex is composed of three major refuges and a grasslands management area located in western Merced County. Two of these refuges, the San Luis Wildlife Refuge and the Merced National Wildlife Refuge, are further divided into units. The Arena Plains Unit, part of the Merced National Wildlife Refuge, which is located approximately 13 miles west of Merced along SR 140, represents wetlands and vernal pool habitat and rare plant species in the region.

Verbal updates through March 10, 2011, from California State Parks Ranger Joanne Carlton for this reference site indicated that special-status plants were not being observed, probably because of seasonally cool weather associated with prolonged rainfall slowing the germination of native forbs in the area. It was noted that the heavy precipitation early in the season was favoring heavy growth of nonnative grasses, particularly foxtail barley (*Hordium jubatum*) and Mediterranean barley (*Hordium marinum*). Heavy growth of nonnative grasses early in the growing season reduces the prevalence of later blooming native forbs. Similar site conditions were confirmed on all subsequent reference site visits.

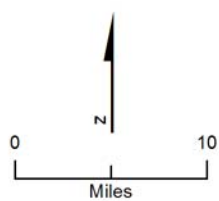
3.5.1.2 Alkali Sink Ecological Reserve

The Alkali Sink Ecological Reserve is located approximately 22 miles west of Fresno along SR 180 in Fresno County. The Alkali Sink area is part of CDFG's ecological reserve system established to protect special-status species and habitats. The alkali sink habitat at this site supports a number of specially adapted plant species, including recurved larkspur (*Delphinium recurvatum*), palmate bird's beak (*Cordylanthus palmatus*), and Hoover's woolly star (*Eriastrum hooveri*), as well as several Atriplex species potentially occurring in the study area.



Source: USFWS 2010, ESRI 2006, GreenInfo Network 2009.

MF_TR_RP_32 Jul 12, 2011



- HST Alignment
- Station Study Area
- Potential Heavy Maintenance Facility
- City Limit
- Railroad
- - - County Boundary

- Alkali Sink
- Pixley Preserve
- Merced National Wildlife Refuge
- Great Valley Grasslands State Park
- Arena Plains Unit of the Merced National Wildlife Refuge
- San Luis National Wildlife Refuge

Figure 3-2
Reference Sites Location Map

The Alkali Sink Ecological Reserve was visited on March 11, 2011. As with the other reference sites visited, forb growth at this site appeared to be minimal, and no special-status plant species were observed. Nonnative grasses, however, were common. Further site visits to the Alkali Sink Ecological Reserve were not made because of access issues associated with weather and roadway conditions. Instead, adjacent alkali sink habitat located in the Mendota Wildlife Area was surveyed for targeted special-status plants expected to occur in this habitat type.

3.5.1.3 Great Valley Grasslands State Park

Great Valley Grasslands State Park is located approximately 28 miles west of Merced near the intersection of SR 140 and SR 165 in Merced County. California State Parks Ranger Joanne Carlton continuously monitors this site, and a survey team visited the site on March 11, 2011. Many of the special-status plant species previously discussed and identified as potentially occurring in the reference areas could be expected to occur in this state park, making it a suitable reference for special-status plants with the potential to occur in the study area.

As with the previous reference sites, little native forb growth was reported or observed because of abundant exotic annual grasses and severe flooding.

3.5.1.4 Pixley Vernal Pools Preserve

Pixley Vernal Pools Preserve is located approximately 4 miles east of the SR 99 corridor in Tulare County. The plant community is classified as northern hardpan vernal pools, and plant composition is similar to vernal pool plant communities observed in the Fresno, Madera, and Merced areas, with navarretias, recurved larkspur, and owl's clover occurring in association with the habitat type. Upland plant species such as fiddleneck (*Amsinckia* sp.), nonnative grasses (bromes [*Bromus* species (spp.)], barley [*Hordium* spp.], wild oats [*Avena* spp.], etc.), and native forbs such as bird's eye gilia (*Gilia tricolor*) and California goldfields (*Lasthenia californica*) observed at the Pixley site are also common to the Central Valley and would be expected to occur in the study area.

Two plant species of interest were observed during the Pixley site visit – the nominate form of vernal pool owl's clover (*Castilleja campestris*) and prostrate navarretia (*Navarretia prostrata*) (Appendix A). Prostrate navarretia is a targeted special-status species that may occur in the study area. Vernal pool owl's clover is a good comparison to the listed subspecies (*C. campestris* subspecies [ssp.] *succulenta*). Nonnative grasses dominated onsite plant composition for the remainder of the flowering plant season.

3.5.1.5 Flying M Ranch

The Flying M Ranch, which is located north of Planada in eastern Merced County, covers about 18 square miles of open annual grassland supporting extensive vernal pool habitat. Team members Thomas Juhasz, Holly Hill, Chris Powers, Virginia Dains, and Michael Clary visited this site on April 17, 2011.

Five plant species of interest were observed during the site visit. These are Hoover's calycadenia (*Calycadenia hooveri*), succulent owl's-clover (*Castilleja campestris* ssp. *succulenta*), Bogg's Lake hedge-hyssop (*Gratiola heterosepala*), pincushion navarretia (*Navarretia myersii* ssp. *myersii*) and San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*). Known habitat for six species of interest was also observed during the site visit, including habitat for beaked clarkia (*Clarkia rostrata*), dwarf downingia (*Downingia pusilla*), little mousetail (*Myosurus minimus* ssp. *apus*), Colusa grass (*Neostapfia colusana*), Hartweg's golden sunburst (*Pseudobahia bahiifolia*), and Greene's tuctoria (*Tuctoria greenii*).

4.0 Results: Environmental Setting

This section includes the physical and biological conditions identified during prefield investigations, reconnaissance-level surveys, and field surveys in the special-status plant study area as well as special-status plant communities known to have suitable habitat within the regional area.

The Merced to Fresno Section of the HST system is located in the Great Valley Ecological Subregion of California and further in the Granitic Alluvial Fans and Terraces Ecological Subsection, which includes the alluvial fans and terraces on the eastern side of the San Joaquin Valley (Miles and Goudey 1998). The fans and terraces in this area were derived predominantly from granitic alluvium originating in the Sierra Nevada. The topography is generally flat with slopes ranging between 0% and 2% and elevations ranging from 160 to 300 feet above mean sea level (amsl). The regional drainage is generally to the west and southwest. The following sections provide a general overview of the land use and terrestrial vegetation communities, climate, hydrology, and soils.

Thirty-six special-status plant species determined to potentially occur within the regional area were evaluated for potential to occur within the habitat study area. Appendix A provides a compilation of special-status species with potential to occur in the study area and includes information pertaining to each species' range, habitat requirements, and the likelihood that the species may be present in the habitat study area. See Figures 4-1 through 4-6 for locations of reported special-status plants in the regional area.

4.1 Existing Physical and Biological Conditions

The existing physical and biological conditions pertinent to the biological resources and jurisdictional waters analysis include geology, ecoregion, climate, terrestrial and aquatic habitats, wetlands and waters, and plants and wildlife observed during the field surveys.

This section includes the physical and biological conditions identified during prefield investigations, reconnaissance-level surveys, and field surveys, including habitats of concern and special-status plant and animal species with potential to occur in the regional area.

4.1.1 Physical Conditions

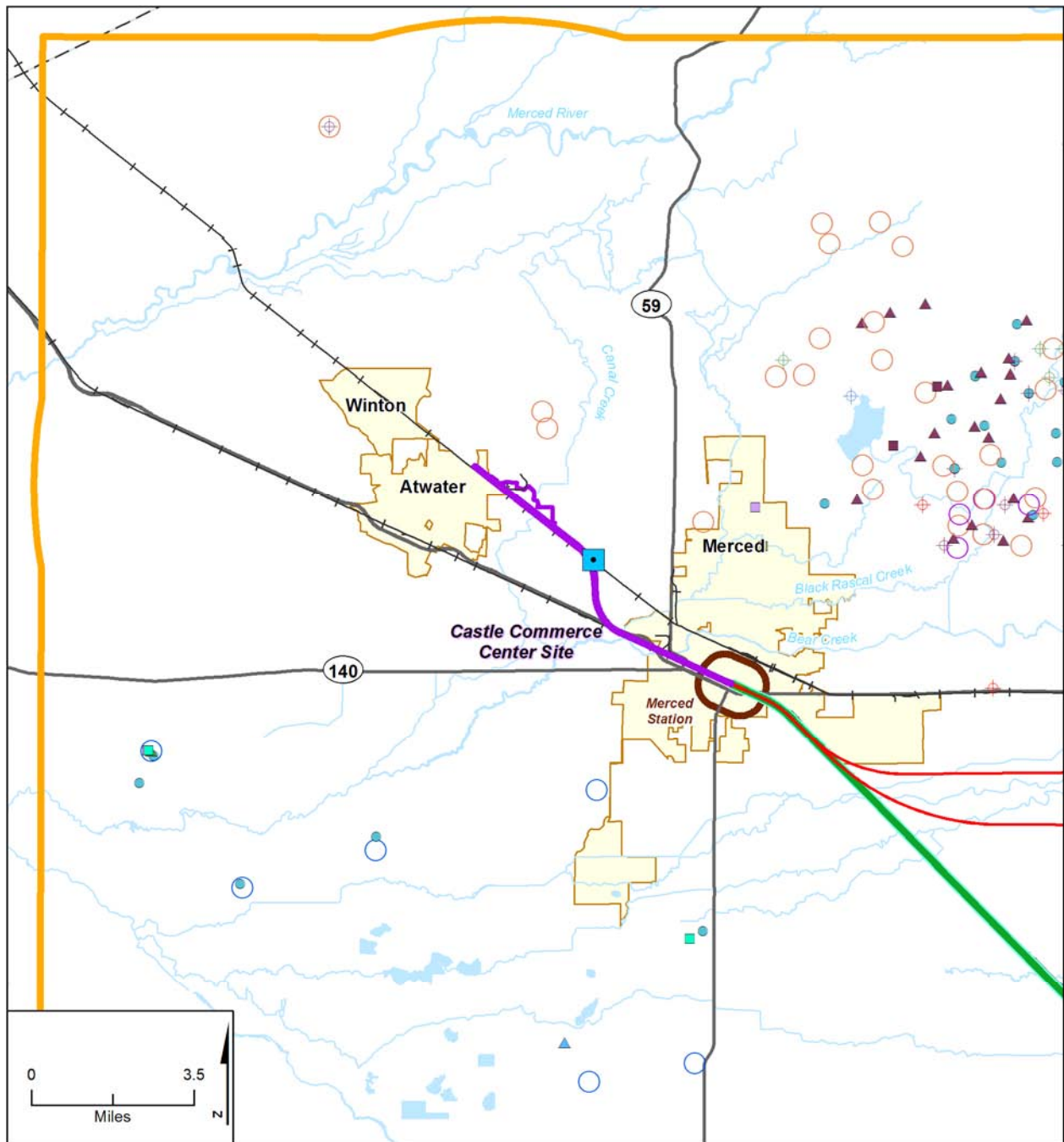
4.1.1.1 Geomorphic Province and Ecological Subregion

The proposed Merced to Fresno HST Project is located within the Great Valley Geomorphic Province and Ecological Subregion. Portions of the project within the Great Valley Ecological Subregion occur in three ecological subsections: Manteca-Merced Alluvium, Hardpan Terraces, and the Granitic Alluvial Fans and Terraces (Miles and Goudey 1998).

The Manteca-Merced Alluvium ecological subsection occurs on the alluvial fans of streams that travel from the Sierra Nevada Mountains to the San Joaquin River. The alluvium deposits are predominantly derived from the erosion of granitic rock from the southern Sierra Nevada region (Miles and Goudey 1998).

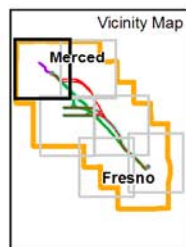
The Hardpan Terraces ecological subsection is characterized by very gently sloping terraces that are interspersed with alluvial fans along streams that transport sediments from the Sierra Nevada region to the Sacramento and San Joaquin rivers. This subsection contains mostly Pleistocene alluvium derived from volcanic, granitic, sedimentary, and metamorphic rock sources (Miles and Goudey 1998).

The Granitic Alluvial Fans and Terraces ecological subsection includes the alluvial fans and terraces on the eastern side of San Joaquin Valley. The fans and terraces in this area were derived predominantly from granitic alluvium originating in the southern Sierra Nevada (Miles and Goudey 1998).



Source: CDFG, CNDDDB (2011), Caltrans

MF_TR_RP_31_a Jul 07, 2011



Observed Special-Status Species

Sanford's arrowhead

CNDDDB Reported Special-Status Species

- Boggs Lake hedge-hyssop
- California jewel-flower
- California satintail
- Colusa grass
- Greene's tuctoria
- Henderson's bent grass
- Hoover's calycadenia
- Hoover's cryptantha

- Keck's checkerbloom
- Madera leptosiphon
- Merced phacelia
- San Joaquin Valley Orcutt grass
- Sanford's arrowhead
- alkali milk-vetch
- beaked clarkia
- caper-fruited tropidocarpum
- dwarf downingia
- hairy Orcutt grass
- heartscale
- lesser saltscale

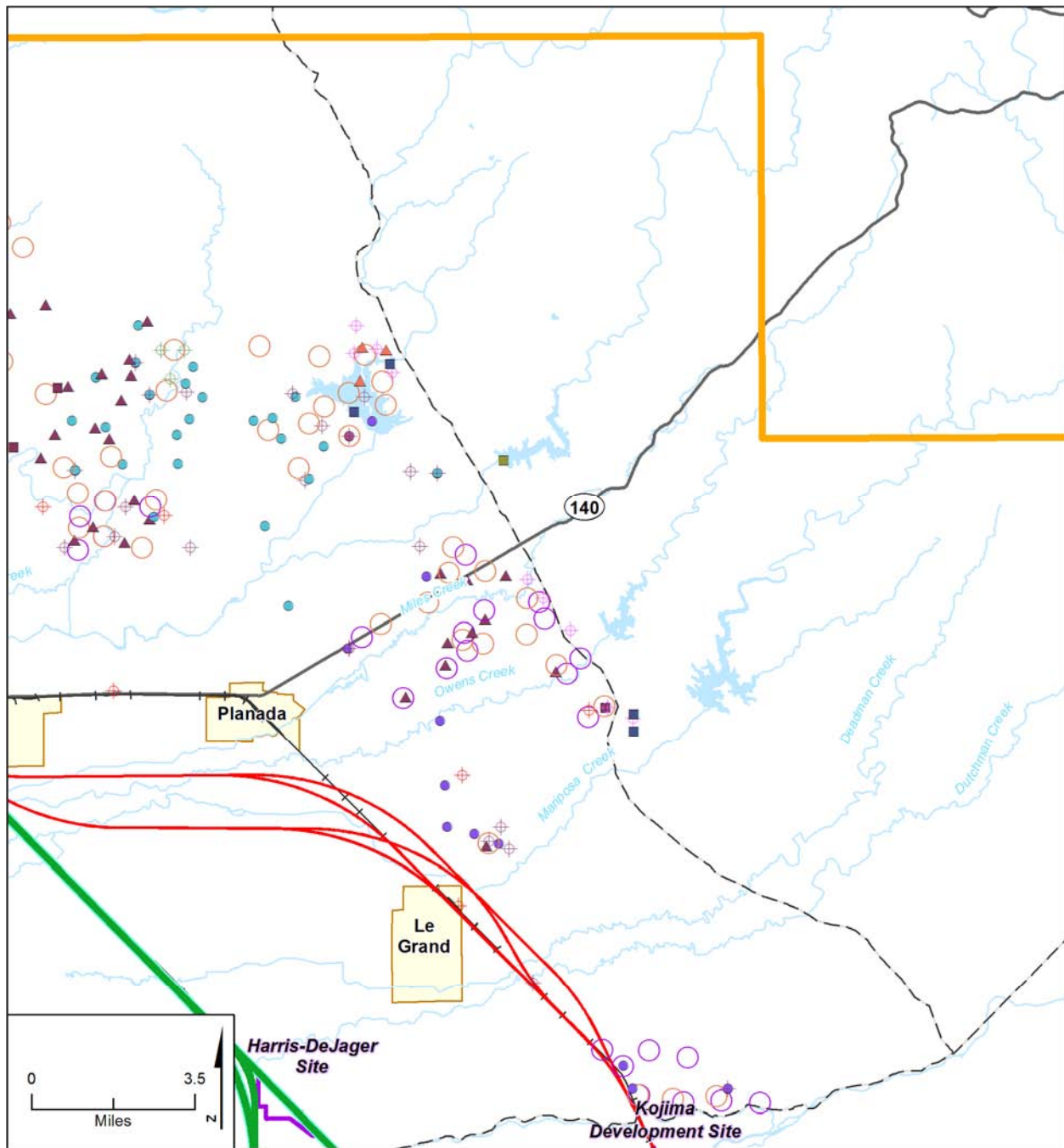
- palmate-bracted bird's-beak
- pin cushion navarretia
- recurved larkspur
- shining navarretia
- spiny-sealed button-celery
- subtle orache
- succulent owl's-clover
- vernal pool smallscale

Caltrans Observed Data

- elderberry

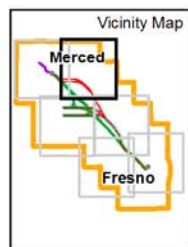
- UPRR/SR 99 Alternative
- BNSF Alternative
- Hybrid Alternative
- Regional Area
- Potential Heavy Maintenance Facility
- City Limit
- County Boundary
- Railroad

Figure 4-1
CNDDDB Reported Special-Status Species - a



Source: CDFG, CNDDDB (2011), Caltrans

MF_TR_RP_31_b Jul 07, 2011



Observed Special-Status Species

Sanford's arrowhead

CNDDDB Reported Special-Status Species

- Boggs Lake hedge-hyssop
- California jewel-flower
- California satintail
- Colusa grass
- Greene's tuctoria
- Henderson's bent grass
- Hoover's calycadenia
- Hoover's cryptantha

- Keck's checkerbloom
- Madera leptosiphon
- Merced phacelia
- San Joaquin Valley Orcutt grass
- Sanford's arrowhead
- alkali milk-vetch
- beaked clarkia
- caper-fruited tropidocarpum
- dwarf downingia
- hairy Orcutt grass
- heartscale
- lesser saltscale

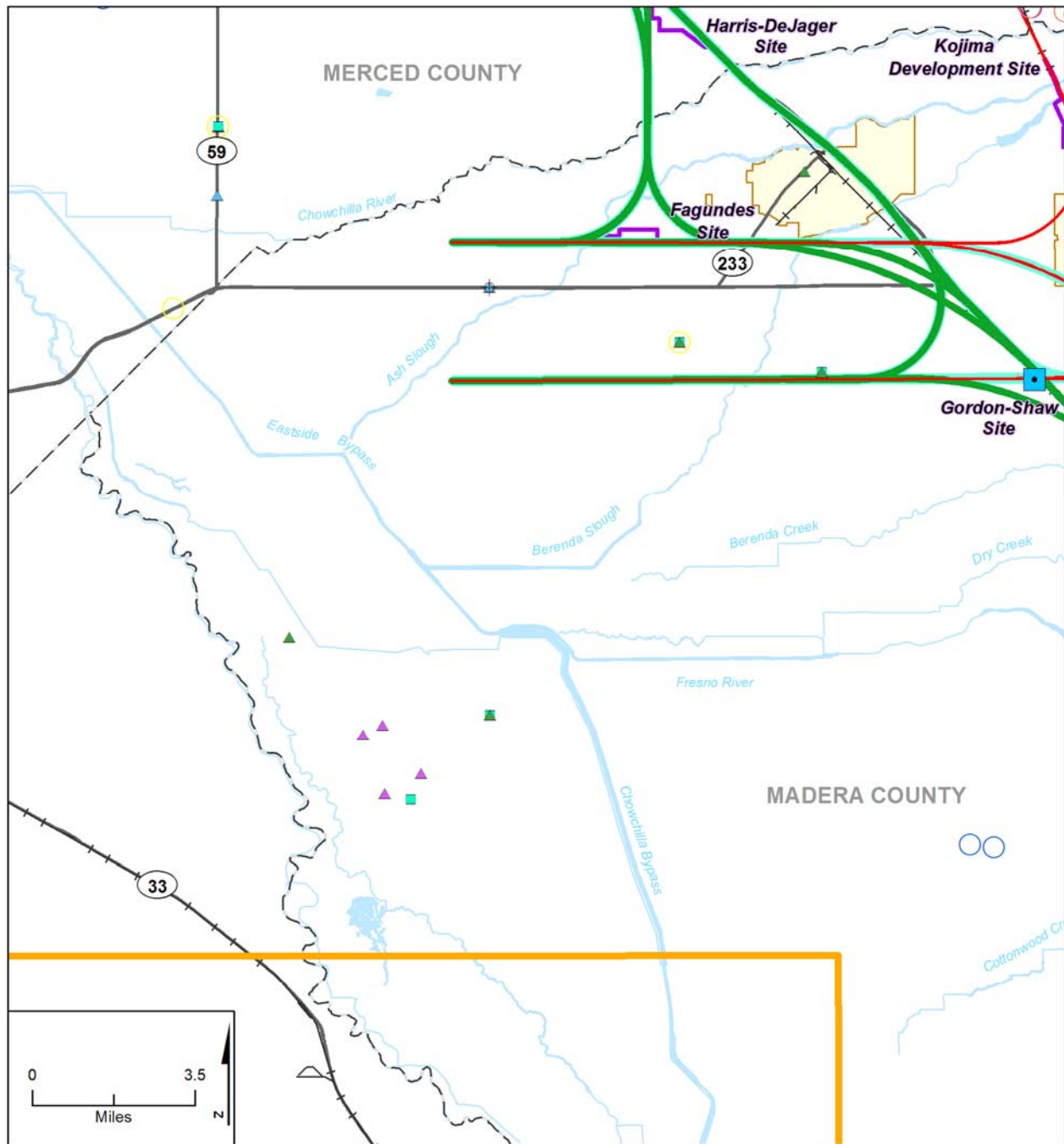
- palmate-bracted bird's-beak
- pincushion navarretia
- recurved larkspur
- shining navarretia
- spiny-sepaled button-celery
- subtle orache
- succulent owl's-clover
- vernal pool smallscale

Caltrans Observed Data

- elderberry

- UPRR/SR 99 Alternative
- BNSF Alternative
- Hybrid Alternative
- Regional Area
- Potential Heavy Maintenance Facility
- City Limit
- County Boundary
- Railroad

Figure 4-2
CNDDDB Reported Special-Status Species - b

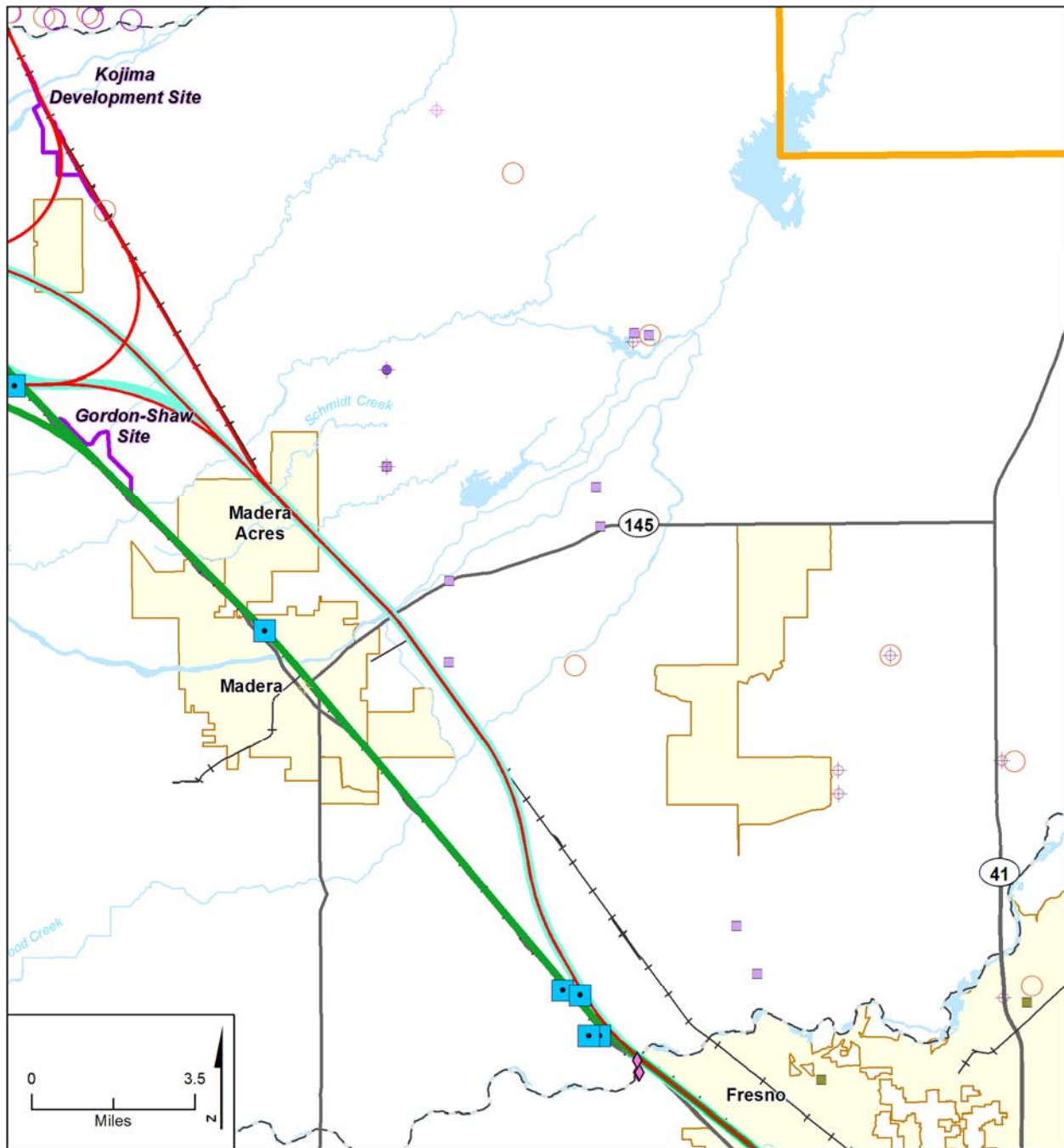


Source: CDFG, CNDDDB (2011), Caltrans

MF_TR_RP_31_c Jul 07, 2011

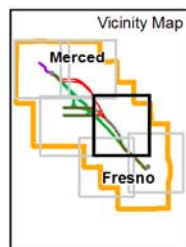


Figure 4-3
CNDDDB Reported Special-Status Species - c



Source: CDFG, CNDDDB (2011), Caltrans

MF_TR_RP_31_d Jul 07, 2011



Observed Special-Status Species

Sanford's arrowhead

CNDDDB Reported Special-Status Species

- Boggs Lake hedge-hyssop
- California jewel-flower
- California satintail
- Colusa grass
- Greene's tuctoria
- Henderson's bent grass
- Hoover's calycadenia
- Hoover's cryptantha

- Keck's checkerbloom
- Madera leptosiphon
- Merced phacelia
- San Joaquin Valley Orcutt grass
- Sanford's arrowhead
- alkali milk-vetch
- beaked clarkia
- caper-fruited tropidocarpum
- dwarf downingia
- hairy Orcutt grass
- heartscale
- lesser saltscale

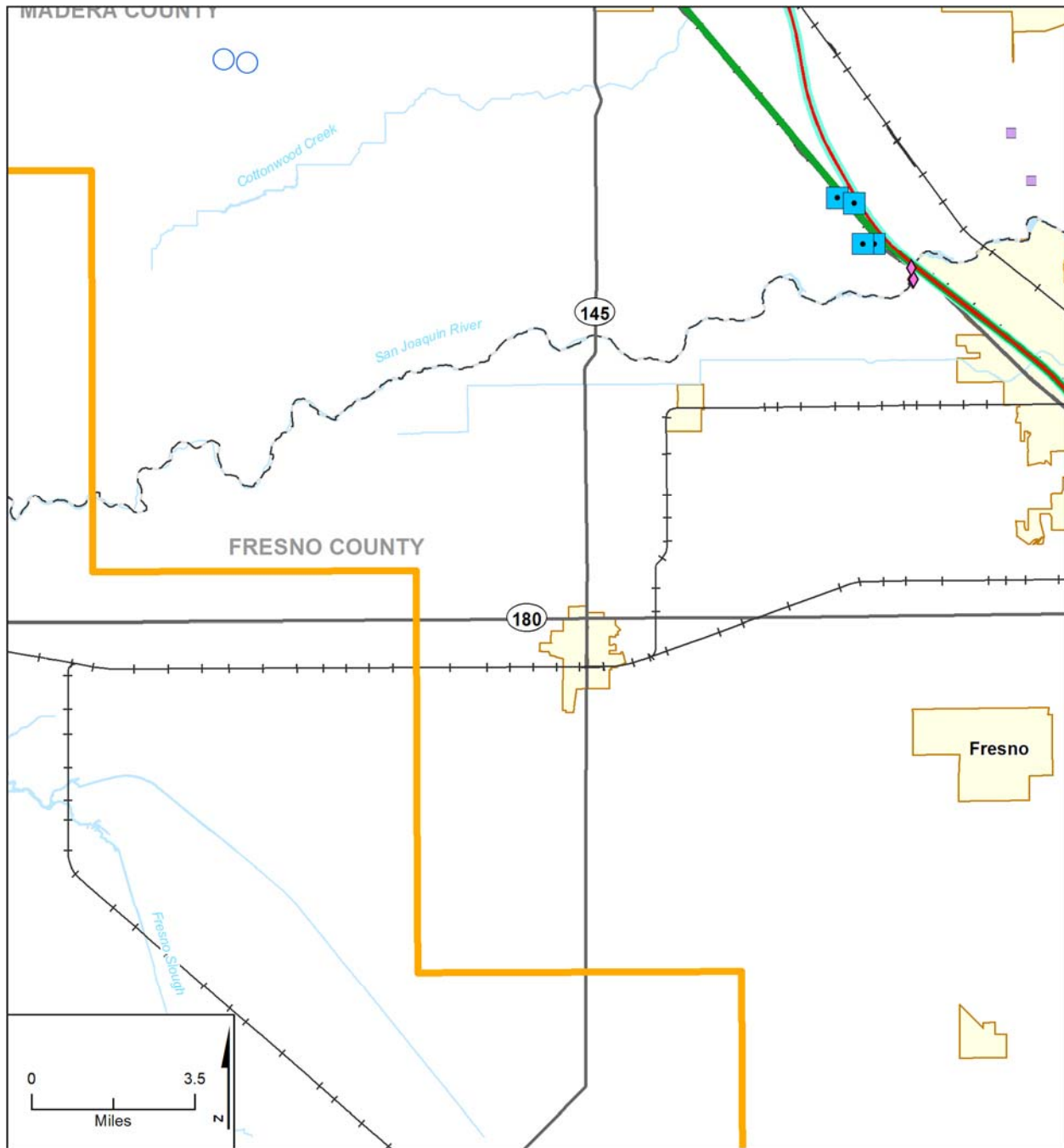
- palmate-bracted bird's-beak
- pincushion navarretia
- recurved larkspur
- shining navarretia
- spiny-sepaed button-celery
- subtle orache
- succulent owl's-clover
- vernal pool smallscale

Caltrans Observed Data

- elderberry

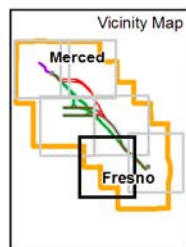
- UPRR/SR 99 Alternative
- BNSF Alternative
- Hybrid Alternative
- Regional Area
- Potential Heavy Maintenance Facility
- City Limit
- County Boundary
- Railroad

Figure 4-4
CNDDDB Reported Special-Status Species - d



Source: CDFG, CNDDDB (2011), Caltrans

MF_TR_RP_31_e Jul 07, 2011



Observed Special-Status Species

- Sanford's arrowhead

CNDDDB Reported Special-Status Species

- Boggs Lake hedge-hyssop
- California jewel-flower
- California satintail
- Colusa grass
- Greene's tuctoria
- Henderson's bent grass
- Hoover's calycadenia
- Hoover's cryptantha

- Keck's checkerbloom
- Madera leptosiphon
- Merced phacelia
- San Joaquin Valley Orcutt grass
- Sanford's arrowhead
- alkali milk-vetch
- beaked clarkia
- caper-fruited troidocarpum
- dwarf downingia
- hairy Orcutt grass
- heartscale
- lesser saltscale

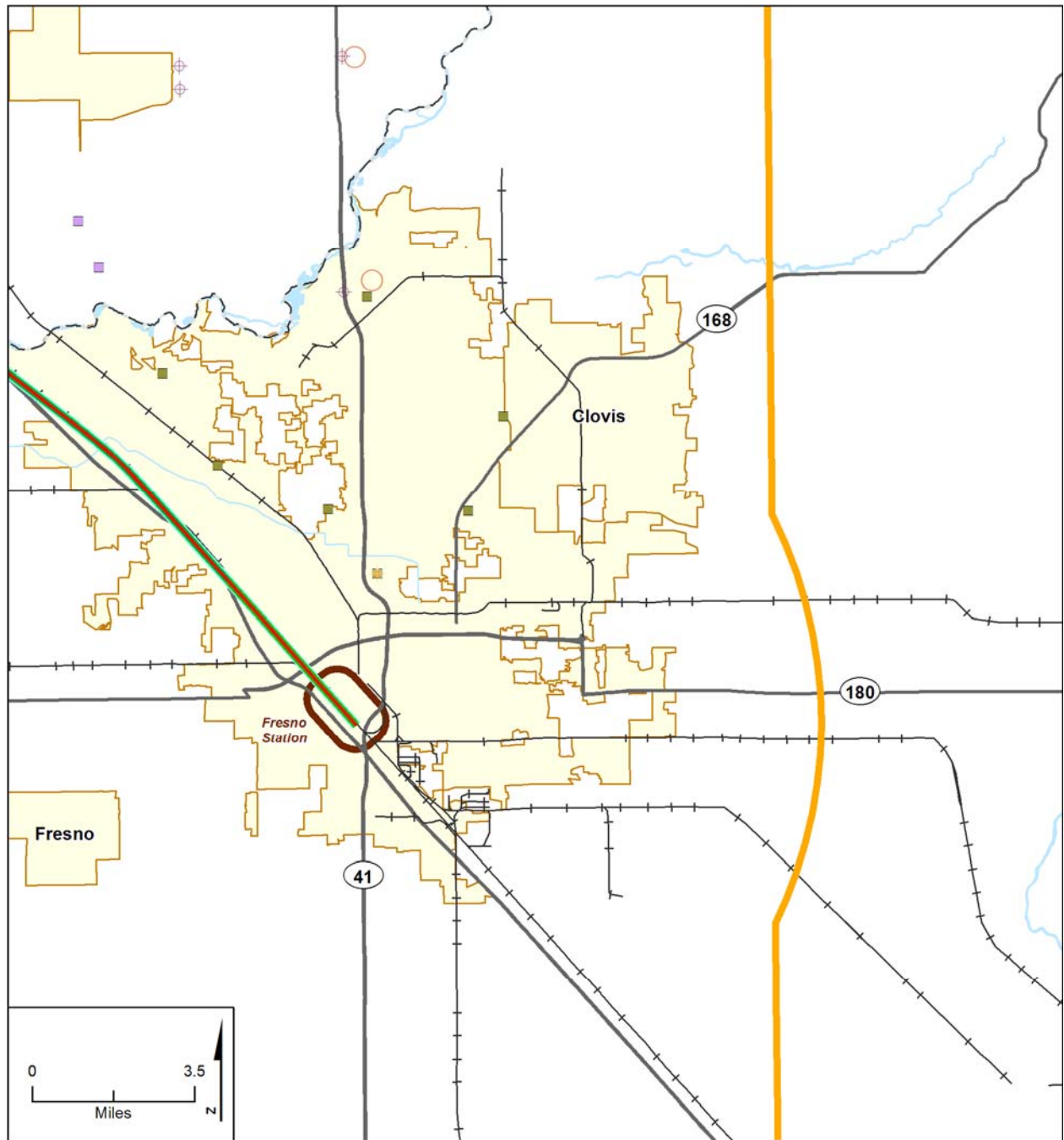
- palmate-bracted bird's-beak
- pincushion navarretia
- recurved larkspur
- shining navarretia
- spiny-sepaed button-celery
- subtle orache
- succulent owl's-clover
- vernal pool smallscale

Caltrans Observed Data

- elderberry

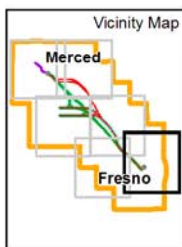
- UPRR/SR 99 Alternative
- BNSF Alternative
- Hybrid Alternative
- Regional Area
- Potential Heavy Maintenance Facility
- City Limit
- County Boundary
- Railroad

Figure 4-5
CNDDDB Reported Special-Status Species - e



Source: CDFG, CNDDDB (2011), Caltrans

MF_TR_RP_31_f Jul 07, 2011



Observed Special-Status Species

Sanford's arrowhead

CNDDDB Reported Special-Status Species

- Boggs Lake hedge-hyssop
- California jewel-flower
- California satintail
- Colusa grass
- Greene's tuctoria
- Henderson's bent grass
- Hoover's calycadenia
- Hoover's cryptantha

Keck's checkerbloom

Madera leptosiphon

Merced phacelia

San Joaquin Valley Orcutt grass

Sanford's arrowhead

alkali milk-vetch

beaked clarkia

caper-fruited tropidocarpum

dwarf downingia

hairy Orcutt grass

heartscale

lesser saltscale

palmate-bracted bird's-beak

pincushion navarretia

recurved larkspur

shining navarretia

spiny-sepaled button-celery

subtle orache

succulent owl's-clover

vernal pool smallscale

Caltrans Observed Data

elderberry

UPRR/SR 99 Alternative

BNSF Alternative

Hybrid Alternative

Regional Area

Potential Heavy Maintenance Facility

City Limit

County Boundary

Railroad

Figure 4-6

CNDDDB Reported Special-Status Species - f

4.1.1.2 Climate and Hydrology

California has a Mediterranean-type climate with cool, wet winters and hot, dry summers. Along the Merced to Fresno Section, mean annual temperatures range from a low of 36°F in December to a high of 98°F in July (Western Regional Climate Center [WRCC] 2010). The growing season (defined as a 50% probability of temperatures at or above 32°F) ranges from 261 days (March 3 to November 19) to 300 days (February 5 to December 1) for Merced and Fresno, respectively (NRCS 2002). Average annual precipitation is approximately 12 inches in Merced and approximately 11 inches in Fresno (WRCC 2010). The majority of the annual rainfall (over 80%) occurs between October and March.

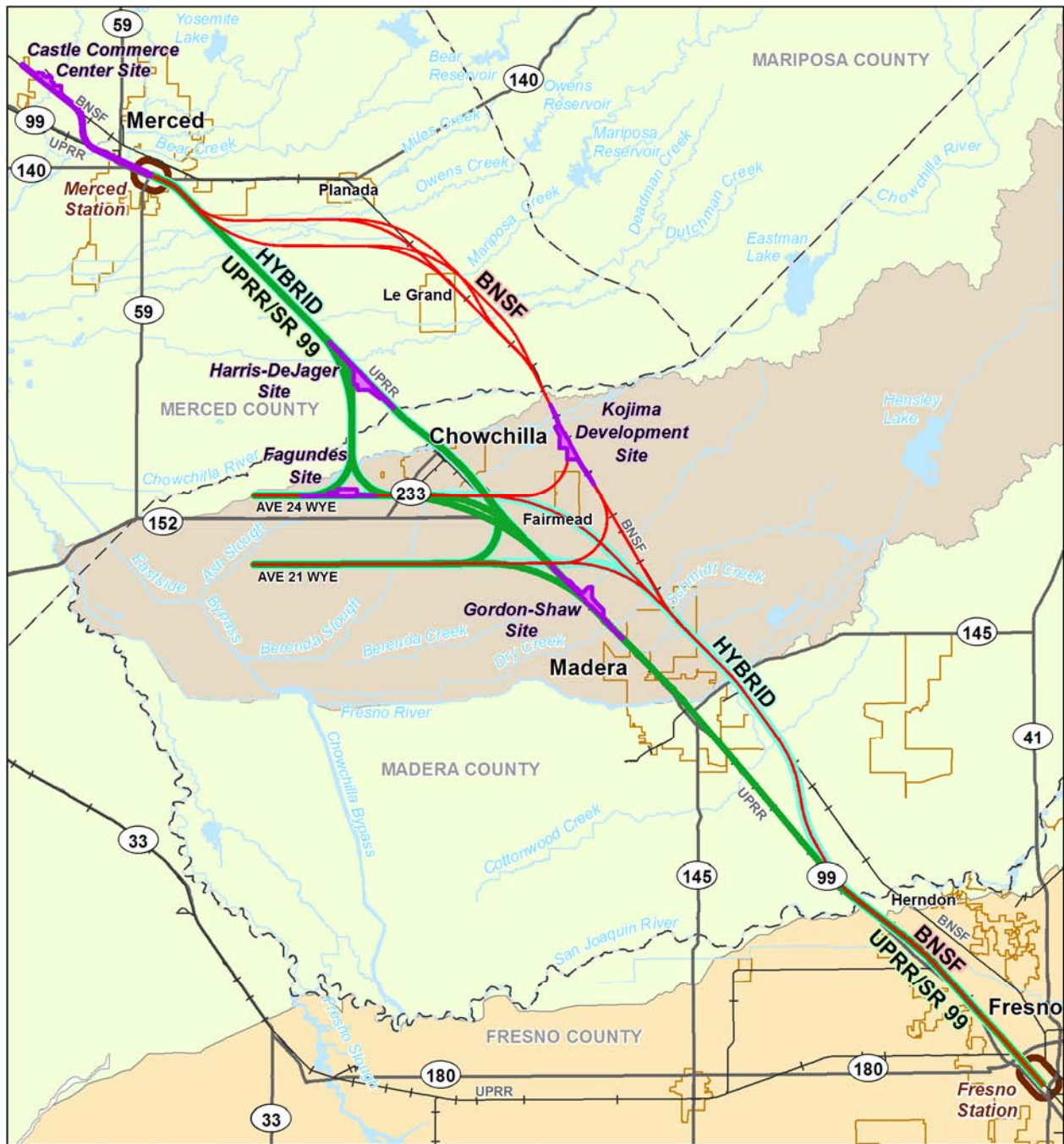
The special-status plant species study area lies in the southern portion of the San Joaquin River Basin. The San Joaquin River Basin extends from the delta in the north to the northerly boundary of the Tulare Lake Basin in the south, and from the crest of the Sierra Nevada Range in the east to the crest of the Coast Ranges in the west. The river basin encompasses about 13,500 square miles. The San Joaquin River Basin includes large areas of high elevation along the western slope of the Sierra Nevada Range. As a result, this river experiences significant snowmelt runoff during the late spring and early summer. Flood flows typically occur between April and June.

The Merced to Fresno Section is located in three watershed subbasins: the Middle San Joaquin–Lower Chowchilla, Fresno River, and Upper Dry. Most of the survey area is located in the Middle San Joaquin–Lower Chowchilla Watershed (Hydrologic Unit Code [HUC] 18040001). The survey area south of the San Joaquin River is located in the Tulare-Buena Vista Lakes Watershed (HUC 18030012). Prominent water features in the study area include Bear Creek, Miles Creek, Owens Creek, Duck Slough, Deadman Creek, Dutchman Creek, the Chowchilla River, Ash Slough, Berenda Slough, Berenda Creek, Dry Creek, the Fresno River, Cottonwood Creek, and the San Joaquin River. The natural hydrology of the region has been substantially altered by construction of dams, storage reservoirs, diversion dams, canals, and groundwater pumping associated primarily with agricultural irrigation.

4.1.1.3 Soils

NRCS soil surveys were used to gather information about soils within the proposed alternatives and HMFs. Soil survey information is typically published by county or geographic area; the soil surveys used for this project were of the Eastern Fresno area (NRCS 1971), Madera area (NRCS 1962a), and Merced area (NRCS 1962b). NRCS soil surveys contain soils information by soil associations and map units. Soil and map units differ in terms of the scale of the survey area. Because of the large area of investigation, soil landform groups are utilized to describe study area soils.

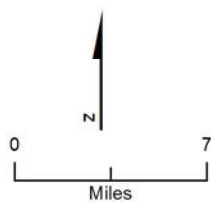
Soils associated with the Merced to Fresno Section exhibit a range of characteristics determined in part by parent material and landscape position. Coarse-textured soils are generally found on recent alluvial fans and floodplains, while medium-textured soils with duripans occur on older alluvial terraces. Fine-textured soils with duripans and salt and alkali accumulation occur in basin areas. In general, soil textures trend finer to coarser north to south along the Merced to Fresno Section. Soils in Merced County are typically fine-textured clays and loamy sands. Soil textures in Madera and Fresno counties are predominantly loams and sands. Drainage and permeability are variable. In general, fine textured soils such as clays and silty clay loam soils are poorly to somewhat poorly drained, with very slow to moderately slow permeability. More coarsely-textured soils, including sandy loams and sand, are typically well drained with moderately rapid permeability.



Source: USDA/NRCS (1999-2010)

MF_TR_RP_28

Jul 07, 2011



- | | |
|---|---|
| — UPRR/SR 99 Alternative | Watershed Subbasin |
| — BNSF Alternative | Middle San Joaquin-Lower Chowchilla |
| — Hybrid Alternative | Fresno River |
| Station Study Area | Upper Dry |
| Potential Heavy Maintenance Facility | |
| City Limit | |
| County Boundary | |
| Railroad | |

Figure 4-7
Watershed Subbasin Map

Figure 4-8 shows the soil associations for the Merced to Fresno Section of the HST. Table 4-1 identifies the soil associations for the four landform groups identified by NRCS (recent alluvial fans and floodplains; older, low alluvial terraces; basin areas, including saline-alkali basins; and high terraces) and the counties in which they are located. The landform groups and their associated soil characteristics are described below. These landform soil descriptions provide soil grouping characteristics and representative landscape position for soils with common characteristics.

4.1.1.4 Recent Alluvial Fans and Floodplains Landform Group

Soils classified in the Recent Alluvial Fans and Floodplains group developed in the nearly level and gently sloping areas along drainage ways, on alluvial fans, and on floodplains. Characteristics often vary greatly within short distances because these soils formed from stratified stream deposits. In the affected area, these soils are medium- to coarse-textured (low amount of clay) and are generally well to somewhat excessively drained (that is, they transmit water well and do not pond). Most of these soils are very deep but some areas may have compacted silt or sand or an iron-silica hardpan at a depth of 2 to 4 feet. Some areas are slightly to moderately saline and alkaline at depth.

4.1.1.5 Older, Low Alluvial Terraces Landform Group

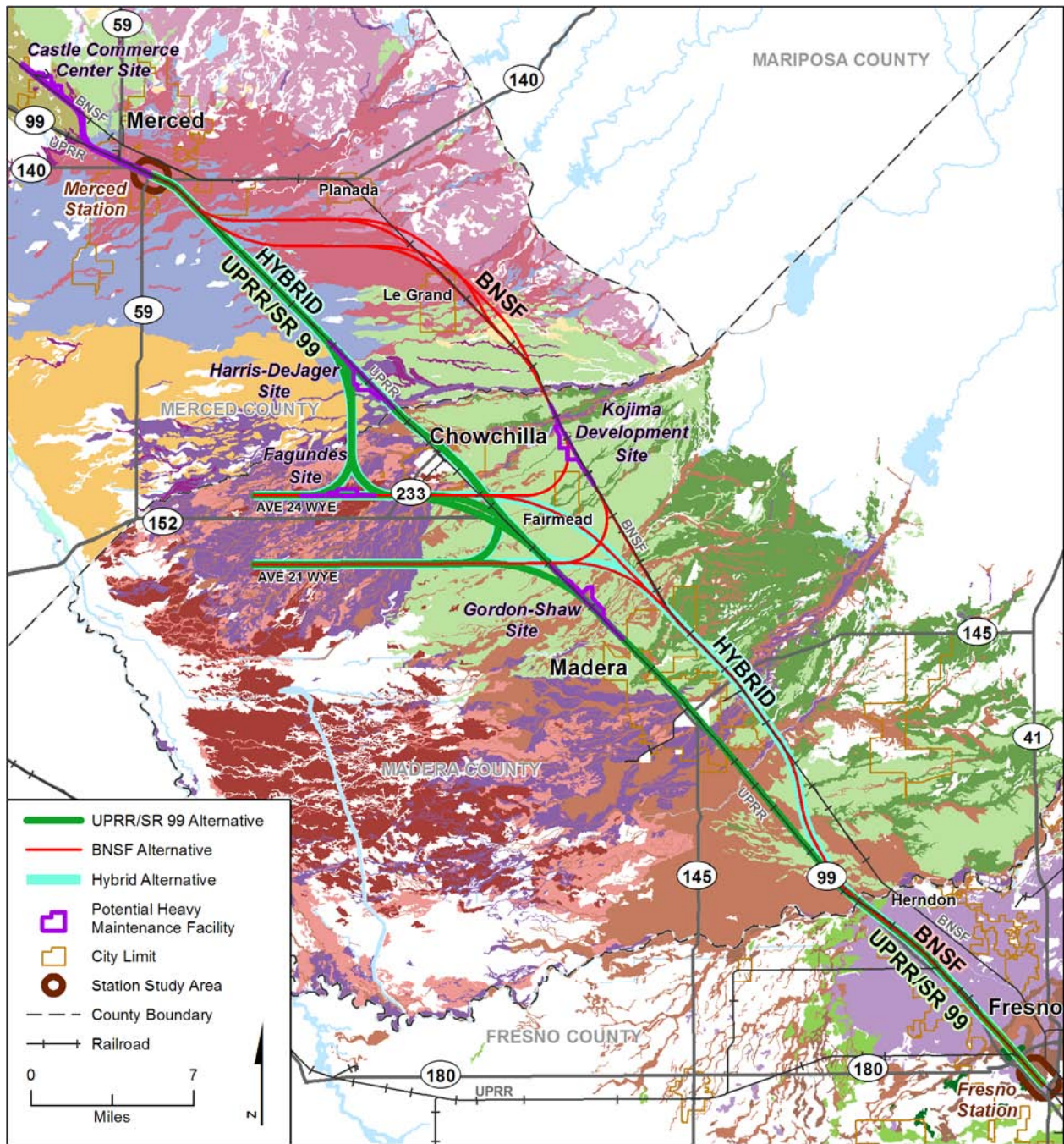
Soils classified in the Older, Low Alluvial Terraces group tend to have a greater degree of soil development than soils on recent alluvial fans. Low alluvial terraces typically have undulating to rolling topography and may have relatively steep slopes in some areas. The soils are medium-textured and typically have a strongly cemented or indurated hardpan in the subsoil (from 12 to 48 inches below the ground surface). The hardpan can be composed of cemented silica or clay; either type creates a layer that is restrictive to roots and water and can create a perched water table.

4.1.1.6 Basin Areas (including Saline-Alkali Basins) Landform Group

Soils classified in the Basin Areas group developed from fine-textured, water-transported sediments and water-soluble lime and salts. The topography of these areas is nearly level to gently undulating. Soils are finer-textured (have more clay) than the alluvial and high terrace soils, and nearly all have accumulations of salts and alkali as a result of poor drainage. Most of these soils have cemented lime-silica hardpans in the subsoil and are shallow to moderately deep.

4.1.1.7 High Terraces Landform Group

Soils classified in the High Terraces group are older than the soils of the other associations and tend to be strongly weathered. Much of the study area is dissected into low hills, resulting in an undulating landscape dominated by mound relief. High terrace soils are coarser than alluvial terrace and basin soils, with textures ranging from fine sandy loam to gravelly loam. Some of the high terrace soils are underlain by an iron-silica hardpan or claypan, both of which may restrict drainage.



Source: NRCS (1962a,b, 1971).

MF_TR_RP_29 Jul 07, 2011

Merced County Associations

- Delhi-Atwater association
- Fresno-Traver association
- Hanford-Grangeville association
- Lewis-Landlow-Burchell association
- Pachappa-Grangeville association
- Redding-Pentz-Peters association
- Rossi-Waukena association
- San Joaquin-Madera association
- Whitney-Rocklin-Montpellier association
- Wyman-Yokohl-Marguerite association

Madera County Associations

- Cometa-Whitney association
- Fresno-El Peco association
- Hanford-Tujunga association
- Pachappa-Grangeville association
- San Joaquin-Madera association
- Traver-Chino association

Fresno County Associations

- Greenfield-Atwater association
- Hanford-Delhi-Hesperia association
- Hanford-Hesperia association
- Hanford-Tujunga association
- San Joaquin-Exeter-Ramona association

Figure 4-8
Soil Associations in the Regional Study Area

Table 4-1
Summary of Soil Associations within the Regional Study Area

Soil Association	Counties of Occurrence	Landform Groups ^a
Pachappa-Grangeville association	Merced, Madera	Recent alluvial fans and floodplains
Hanford-Tujunga association	Madera, Fresno	
Hanford-Grangeville association	Merced	
Wyman-Yokohl-Marguerite association	Merced	
Hanford-Hesperia association	Fresno	
Hanford-Delhi-Hesperia association	Fresno	
Greenfield-Atwater association	Fresno	
Delhi-Atwater association	Merced	
San Joaquin-Madera association	Merced, Madera	Older, low alluvial terraces
San Joaquin-Exeter-Ramona association	Fresno	
Cometa-Whitney association	Madera	
Fresno-Traver association	Merced	Basin areas (including saline-alkali basins)
Lewis-Landlow-Burchell association	Merced	
Fresno-El Peco association	Madera	
Traver-Chino association	Madera	
Rossi-Waukena association	Merced	
Whitney-Rocklin-Montpellier association	Merced	High terraces
Redding-Pentz-Peters association	Merced	
^a As mapped by NRCS, not necessarily observed in the study area. Sources: NRCS (1962a, 1962b, 1971 modified from Authority and FRA [2011c]).		

4.1.2 Biological Conditions

Historically, the Central Valley was characterized by California prairie, marshlands, valley oak (*Quercus lobata*) savanna, and extensive riparian woodlands (Hickman 1993). Today, more than 80% of the land is covered by farms and ranches (NRCS 2006). Urban areas within or near the habitat study area include the communities of Atwater, Merced, Le Grand, Chowchilla, Madera, and Fresno. Based on habitat assessment data, natural vegetation communities are uncommon within the special-status plant species study area and are limited to uncultivated areas supporting California annual grassland and narrow bands of riparian and emergent wetland habitat along the rivers, creeks, and sloughs. Certain areas of terrestrial California annual grassland also support vernal pool aquatic habitat.

Biological conditions discussed in this section are derived from observations conducted within the special-status plant species study area during reconnaissance-level habitat mapping surveys and the March 2011 field survey.

4.1.2.1 Terrestrial Habitats and Land Uses

This section discusses the eight types of agricultural lands, five types of developed lands, and five types of natural and seminatural terrestrial habitats mapped in the special-status plant species study area. Due to the level of disturbance observed in all areas of the special-status plant species study area, terrestrial

areas do not provide pristine high-quality habitat for special-status species; however, areas of potentially suitable habitat exist that are of a relatively higher quality than other areas. For the purposes of this report, potentially suitable habitat is therefore described as either moderate quality or low quality.

The following descriptions of agricultural lands and developed areas are based on *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer 1988). Table 4-2 provides equivalent descriptions of natural and semi-natural habitat types from other classification systems, including the *Manual of California Vegetation* (Sawyer et al. 2009), *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986), and *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979).

Table 4-2
Approximate Relationships of Vegetation Classifications Systems

Terminology for Plant Community Used in this Report	Preliminary Descriptions of the Terrestrial Natural Communities of California (Holland 1986)	Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979)	Manual of California Vegetation (Sawyer et al. 2009)	Guide to Wildlife Habitats of California (Mayer and Laudenslayer 1988)
California Annual Grassland	Nonnative Grassland (42200)	No corresponding vegetation type provided.	Amsinckia (<i>menziesii</i> , <i>tessellata</i>) Alliance	Annual Grassland
Coastal and Valley Freshwater Marsh	Coastal and Valley Freshwater Marsh (52410)	Palustrine Emergent Wetland	<i>Schoenoplectus californicus</i> Herbaceous Alliance	Fresh Emergent Wetland (FEW)
Eucalyptus Woodlands	No corresponding vegetation type provided.	No corresponding vegetation type provided.	Eucalyptus (<i>Globulus</i> , <i>camaldulensis</i>) Semi-natural Woodland Stands	Eucalyptus (EUC)
Fremont Cottonwood Forested Wetland	Great Valley Cottonwood Riparian Forest	Palustrine Forested Wetland (in part)	<i>Populus fremontii</i> Forest Alliance	No corresponding vegetation type provided.
Great Valley Mixed Riparian Forest	Great Valley Mixed Riparian Forest (61420)	Palustrine Forested Wetland (in part)	<i>Populus fremontii</i> Forest Alliance	Valley Foothill Riparian
Constructed Watercourses	No corresponding vegetation type provided.	No corresponding vegetation type provided.	No corresponding vegetation type provided.	No corresponding vegetation type provided.
Natural Watercourses	No corresponding vegetation type provided.	Riverine	No corresponding vegetation type provided.	Riverine (RIV)
Other Riparian	Central Coast Arroyo Willow Riparian Forest (61230); Great Valley Willow Scrub (63000); Great Valley Valley Oak Riparian Forest (61430)	Palustrine Forested Wetland (in part)	<i>Salix lasiolepis</i> Shrubland Alliance; <i>Rubus armeniacus</i> Semi-natural shrubland stands; <i>Quercus lobata</i> Woodland alliance	Fresh Emergent Wetland; Valley Foothill Riparian; Valley Oak Woodland

Terminology for Plant Community Used in this Report	Preliminary Descriptions of the Terrestrial Natural Communities of California (Holland 1986)	Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979)	Manual of California Vegetation (Sawyer et al. 2009)	Guide to Wildlife Habitats of California (Mayer and Laudenslayer 1988)
Ruderal Vegetation	No corresponding vegetation type provided.	No corresponding vegetation type provided.	No corresponding vegetation type provided.	No corresponding vegetation type provided.

Agricultural Lands

Agricultural lands account for approximately 65% of the land use in the special-status plant species study area. Orchards, vineyards, fallow fields, row crops, and field crops constitute 56%, while dairies, pastures, and inactive agriculture constitute the remaining 9%. Constructed watercourses and basins associated with agriculture such as canals, drains, and tailwater ponds are discussed in Section 4.1.2.2 – Aquatic Habitats. Agricultural lands provide limited plant and wildlife habitat value relative to natural and semi-natural habitats as a result of lower species diversity and uniform vegetation structure. Additionally, wildlife species are often regarded as pests, and many farmers will actively haze birds and poison animals to reduce crop damage and loss. Vegetation other than the managed crop generally comprises weedy species adapted to high levels of disturbance and is often actively managed with herbicides, mowing, and/or tilling. Sparse annual grasses and weedy forbs may be present within hay fields and along the crop edges; however, because these weeds decrease crop value, these undesirable plants are often eradicated.

The following sections describe the agricultural types identified in the special-status plant species study area.

Orchards

Almond trees (*Prunus dulcis*) are the most common orchard crop in the special-status plant species study area. Other deciduous orchard crops include pistachios (*Pistacia vera*), walnut trees (*Juglans regia*), fig trees (*Ficus* sp.), and pomegranate trees (*Punica* spp.). Evergreen orchards such as oranges and lemons (*Citrus* spp.) are also present. Orchards consist of monocultures of evenly spaced, generally low, bushy trees that are similar in canopy size and tree height. Canopy cover ranges from open to dense depending on the age of the trees, with saplings and young trees having relatively open canopies and older trees providing more closed canopy cover. Depending on management levels, the understory is either devoid of vegetation or comprised of various weedy annual grasses and forbs. Where herbaceous vegetation is present, it is often mowed, sprayed, or tilled to facilitate harvest and conserve water. Most of the orchards in the special-status plant species study area are flood-irrigated.

Vineyards

Vineyards include cultivated wine, table, and raisin grapes (*Vitis* spp.) grown in evenly spaced rows that are variable in canopy cover depending on the age and growth of the vines. The understory vegetation is variable depending on management practices. In some vineyards, herbaceous vegetation is nearly absent, and in other areas weedy annual grasses and forbs are common. Where herbaceous vegetation is present, it is often managed with herbicides, mowing, and/or tilling. Flood and drip methods are most commonly used to irrigate the vineyards in the special-status plant species study area.

Field Crops

Field crops consist of monocultures that are intensely managed and frequently harvested and replanted, often on a seasonal rotational basis. Field crops include dry land grain crops and irrigated hay crops. Dry

land grain crops include nonirrigated annual grass crops such as wheat (*Triticum* spp.), barley, and rye (*Secale cereale*). Other annual grasses and herbaceous weeds are frequently interspersed along the margins of dry crop fields. Common irrigated hay crops include species such as timothy (*Phleum pratense*), oats, orchard grass (*Dactylis glomerata*), millet (*Panicum miliaceum*), red clover (*Trifolium pratense*), and alfalfa (*Medicago sativa*). Within the special-status plant species study area, these crops are planted as monocultures in large, predominantly flood-irrigated fields. Irrigated hay crops are common throughout the special-status plant species study area and are often associated with dairy farms, as they are grown as silage.

Row Crops

Irrigated row crops in the San Joaquin Valley include sweet potatoes (*Ipomoea batatas*), cotton (*Gossypium herbaceum*), tomatoes (*Solanum lycopersicum*), lettuce (*Lactuca* spp.), beans (*Phaseolus vulgaris*), and garlic (*Allium sativum*). Most field and row crops in the special-status plant species study area are flood-irrigated, although sprinkler irrigation is used in some areas.

Irrigated grain crops include corn (*Zea mays*), safflower (*Carthamus tinctorius*), and milo (*Sorghum* spp.) grown as silage for dairy cows. Nonnative annual grasses and herbaceous weeds are uncommon as a result of active cultivation, herbicide application, and shading from the mature corn stalks.

Fallow Fields

Fallow fields, as used in this report, are defined as: (1) generally bare dirt agricultural fields that have been tilled but have no evidence of a currently planted crop; (2) old orchards and vineyards where the vines or trees had been cut and removed and the soil had recently been tilled; or (3) irrigated hay, grain, or field crops that had been recently harvested but had no evidence of actively growing crops. Fallow fields are generally devoid of vegetation due to recent tilling and cultivation. Abandoned fields or recently disked fields that showed no evidence of recent cultivation and were characterized by nonnative annual grasses and other ruderal species were not considered fallow fields, but were mapped as either inactive agriculture or ruderal habitat as described below.

Dairies

Dairy farms within the special-status plant species study area are large industrial-scale farming operations that include barns and other farm buildings, feed lots, silage storage areas, and manure settling basins. These areas are generally devoid of herbaceous vegetation but may include trees.

Pastures

Pastures are generally enclosed within fences and comprised of a mixture of annual and perennial grasses and forbs that provide forage for domestic livestock. Most of the pastureland in the special-status plant species study area is associated with rural residential areas. While some pastures may be enhanced through the seeding of desirable forage plants such as tall fescue (*Schedonorus phoenix*), ryegrass (*Lolium multiflorum*), and various clovers (*Trifolium* spp.), they are less intensively managed than other types of agricultural lands and have a relatively low native diversity but often support some (usually minor) component of native California annual grassland species. Irrigation is variable, with some pasture areas flood- or sprinkler-irrigated while others are managed as dry-land pasture only. This habitat type is distinguished from extensive areas of California annual grassland that may be used as rangeland.

Inactive Agriculture

Inactive agriculture includes fields that have evidence of past cultivation (including surrounding landscape, evidence of tillage, leveled fields and/or irrigation checks and furrows) but are not currently used for crop production. These areas may have been recently disked but show no evidence of recent cultivation, resulting in dense growth of nonnative annual grasses such as ripgut brome (*Bromus diandrus*), soft chess, (*Bromus hordeaceus*), oats, Italian ryegrass (*Lolium* spp.), barley, and weedy forbs such as bur clover (*Medicago polymorpha*), prickly lettuce (*Lactuca serriola*), filaree (*Erodium botrys*),

and yellow star-thistle (*Centaurea solstitialis*). While species composition is similar to that of California annual grassland and ruderal areas, inactive farmland areas generally support a very low diversity and abundance of native plant species and are distinguished by a high degree of disturbance as a result of past cultivation.

Developed Areas

Developed areas constitute approximately 21% of the special-status plant species study area and include various types of urban and rural developed land use. Developed areas include urban areas, commercial and industrial buildings, transportation corridors, and barren areas where vegetation has been removed or is absent.

Barren

Barren areas are open plots of rock, gravel, or soil that are either completely devoid of vegetation or contain only sparse (less than 2%), widely scattered, predominantly weedy herbaceous plants. Within the special-status plant species study area, barren areas are associated with equipment yards adjacent to agricultural fields and various water storage or delivery features.

Urban

Urban habitat includes relatively higher density residential areas and parks that may include landscaped areas, yards, gardens, and various buildings. Many urban areas include large landscape and shade trees such as ash (*Fraxinus* spp.), cedar (*Cedrus* spp.), eucalyptus (*Eucalyptus* spp.), London plane (*Platanus* spp.), maple (*Acer* spp.), redwood (*Sequoia sempervirens*), and pine (*Pinus* spp.). Because of a significant agricultural component, rural residential habitat is described above as an agricultural habitat type. Parkland includes developed and maintained open, grassy areas, picnic facilities, and children's playgrounds. Larger parks, such as Roeding Park in the city of Fresno, may include a pond or small lake.

Commercial and Industrial

Commercial and industrial areas include urban shops, businesses, warehouses, industrial plants, factories, junkyards, equipment storage yards, airports, and various municipal facilities as well as associated parking lots. Rural commercial areas include landfills, farm equipment yards, and agricultural processing and storage facilities; dairy farms are not considered to be a commercial and industrial habitat type but are instead described separately as an agricultural habitat type. Urban commercial and industrial areas often have associated landscaped vegetation.

Transportation Corridors

Transportation corridors in the special-status plant species study area include roads and railways, including portions of SR 99, SR 152, and SR 145; numerous paved urban and county roads; and the UPRR and BNSF railways. For the purpose of habitat characterization, narrow strips of landscaped and/or ruderal vegetation associated with these corridors were not separately mapped and quantified; instead, these areas were mapped together with their associated corridor. Dirt farm roads associated with agricultural fields also were not distinguished separately from the adjacent agricultural land use.

Natural and Semi-Natural Habitats

Natural and semi-natural habitats are distinguished from the land uses and vegetation types described in the previous sections by the degree of current human influence on the vegetation composition and structure. While the natural and semi-natural vegetation types have been altered to some extent by past and present human activities, the composition and structure of these communities is generally not actively managed or controlled. A distinction is also made between those habitats that are largely characterized by native vegetation and those in which the dominant vegetation comprises introduced species. Natural and semi-natural habitats associated with aquatic features such as vernal pools and riparian corridors are discussed in Section 4.1.2.2 – Aquatic Habitats. Natural and semi-natural terrestrial

habitats, including California annual grassland, Great Valley mixed riparian forest, other riparian, eucalyptus woodland, and ruderal vegetation habitats are described below.

California Annual Grassland

California annual grassland habitat within the special-status plant species study area is best classified as part of the *Amsinckia (menziesii, tessellata)* alliances defined by Sawyer et al. (2009) and the nonnative grassland type described by Holland (1986) (Table 4-2). This community is characterized by an open to dense cover of grasses and herbaceous species less than 3 feet high. Scattered trees and shrubs may be present but provide minimal cover.

California annual grassland in the special-status plant species study area is characterized by large expanses of open grassland comprised of nonnative annual grasses such as ripgut brome, soft chess, foxtail barley, medusa-head (*Taeniatherum caput-medusae*), and wild oat. Common nonnative herbaceous species include yellow star-thistle, Italian thistle (*Carduus pycnocephalus*), prickly lettuce, mustards (*Brassica* spp.), and wild radish (*Raphanus sativa*). Many native annual and perennial herbaceous species may also be present within this grassland community. California annual grasslands may be used for cattle or sheep grazing, but these areas are not actively managed as pasture. Areas of California annual grassland are on soils suitable for vernal pools.

Great Valley Mixed Riparian Forest

Great Valley mixed riparian forest communities include sensitive riparian communities as identified on the List of California Terrestrial Natural Communities Recognized by the CNDDDB (CDFG 2003). Great Valley mixed riparian forest (a sensitive biological community), is equivalent to the valley foothill riparian community as defined by the California Wildlife Habitat Relationships (CWHR) System.

The cottonwood-willow riparian community is part of the *Populus fremontii* Forest Alliance, Fremont cottonwood forest as described by Sawyer et al. (2009), and most closely resembles the Great Valley cottonwood riparian forest described by Holland (1986). Mixed riparian forest and woodland most closely resembles the *Populus fremontii* Forest Alliance described by Sawyer et al. (2009), while Holland (1986) describes this community as Great Valley mixed riparian forest.

Other Riparian

Several types of nonsensitive riparian communities were identified within the study area. Willow riparian forest in the special-status plant species study area may be classified as part of the *Salix lasiolepis* Shrubland Alliance (arroyo willow thickets) as defined by Sawyer et al. (2009) and most closely resembles the central coast arroyo willow riparian forest described by Holland (1986). Himalayan blackberry brambles and giant reed (*Arundo donax*) (Sawyer et al. 2009) are also present in riparian communities.

Riparian communities are located on the banks of natural waterways including streams, sloughs, and rivers and, in some cases, constructed waterway features. Riparian areas occur along the banks of rivers and streams and are generally characterized by a prevalence of hydrophytic vegetation but do not meet other criteria for wetlands. Riparian communities may consist of overstory species that are facultative wetland; however, soils, hydrology, and/or understory vegetation are not representative of wetland communities.

Riparian communities can be found throughout the regional area. Riparian areas form transition zones between terrestrial and aquatic ecosystems, providing essential habitat for a large variety of terrestrial as well as aquatic wildlife species.

Eucalyptus Woodlands

Eucalyptus woodlands are classified by Sawyer et al. (2009) as eucalyptus (*E. globulus*, *E. camaldulensis*) semi-natural woodland stands or eucalyptus groves. There is no corresponding natural community type in Holland (1986). These areas are characterized by relatively dense stands of eucalyptus trees. Within the

special-status plant species study area, the understory vegetation typically comprises introduced annual grasses such as ripgut brome and Bermuda grass (*Cynodon dactylon*) with goose grass (*Galium aprine*) and dovefoot geranium (*Geranium molle*). In some areas, giant reed is also a common associated understory species.

Ruderal Vegetation

Ruderal vegetation types occur in areas where the natural vegetation has been removed or significantly degraded by past or current human activity. Ruderal vegetation is often associated with vacant lots, roadsides, and other highly disturbed areas. Vegetation in these areas is highly variable but often includes a mix of nonnative annual grasses such as ripgut brome, soft chess, wild oat, Italian ryegrass, foxtail barley, and weedy forbs such as bur clover, filaree, yellow star-thistle, Italian thistle, milk thistle (*Silybum maritimum*), Russian thistle (*Salsola tragus*), and many others. Due to the highly variable nature of ruderal habitats, this type was not classified according to Sawyer et al. (2009) or Holland (1986). Ruderal areas may be similar to California annual grassland but are characterized by a greater level of disturbance. Ruderal areas are also similar to inactive farmland but do not occur in areas with evidence of active farming in the recent past.

4.1.2.2 Aquatic Habitats

This section describes the wetland and other water features that were mapped in the special-status plant species study area. Jurisdictional waters are further discussed as Habitats of Concern in Section 5.4 and are evaluated in detail in the Wetland Delineation Report (Authority and FRA 2011a). Jurisdictional water types have been broadly classified following the *A Hydrogeomorphic Wetland Classification System* (USACE 1993) and the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979).

Depressional/Palustrine Wetlands

Depressional wetlands are a hydrogeomorphic class of wetlands that occur in topographic depressions where the dominant water sources are precipitation, groundwater discharge, and both inflow and overland flow from the adjacent uplands (USACE 1993). The palustrine system is a broad class of nontidal wetlands that was developed to include vegetated wetlands traditionally called by names such as marsh, swamp, bog, fen, and prairie. The palustrine system also includes small, shallow permanent or intermittent water bodies such as ponds. Palustrine wetlands may be situated shoreward of lakes, river channels, or estuaries; on river floodplains; in isolated catchments; or on slopes. They may also occur as islands in lakes or rivers (Cowardin et al. 1979). Palustrine wetlands identified within the special-status plant species study area include vernal pools, coastal and valley freshwater marsh, Fremont cottonwood forested wetlands, retention basins, and agricultural tailwater ponds.

Fremont Cottonwood Forested Wetland

Fremont cottonwood forested wetlands occur on soils intermittently or seasonally flooded or saturated by freshwater systems. Frequently, these community types are found along riparian corridors, floodplains subject to high-intensity flooding, or on low-gradient depositions along rivers and streams. These communities are described as typically containing an overstory dominated by Fremont cottonwood or mixed with other tree species including box elder (*Acer negundo*), Oregon ash (*Fraxinus latifolia*), California walnut (*Juglans californica*), or California sycamore (*Platanus racemosa*). The shrub layer within this community type is typically dominated by willow species (*Salix* spp.) and California wild grape (*Vitis californica*). The understory of Fremont cottonwood forested wetlands may support emergent perennial vegetation such as cattails, sedges, and rushes. Freshwater forested wetlands are nontidal, flooded, depressional wetlands and are categorized as Cowardin class: palustrine forested wetland (PFO). The *Populus fremontii* Forest Alliance, Fremont cottonwood forested wetland, is described by Sawyer et al. (2009) and is similar to the Great Valley cottonwood riparian forest described by Holland (1986).

Vernal Pools and Other Seasonal Wetlands

Vernal pools are a type of seasonal wetland characterized by a low, amphibious, herbaceous community dominated by annual herbs and grasses. Vernal pools are insular, astatic ecosystems that respond markedly to winter precipitation and summer desiccation. Vernal pools are associated with certain types of soil formations. Hardpan soil layers frequently form in the horizons of clay soils, leading to the formation of vernal pools with clay soils. California annual grassland can occur on similar types of soil formations but is not exclusively found associated with vernal pools. Once formed, these vernal pools have a specific flora and fauna associated with seasonal hydrology. The standing water that forms in vernal pools is ideal breeding habitat for several special-status species such as vernal pool fairy shrimp, Conservancy fairy shrimp, vernal pool tadpole shrimp, California tiger salamander (*Ambystoma californiense*), and western spadefoot toad (*Spea hammondi*). This plant community type is a CDFG special-status plant community and is a subclass of depressional wetlands, which are considered palustrine emergent seasonally flooded wetlands (PEMC).

Common plant species observed in vernal pools include woolly marbles (*Psilocarphus brevissimus*), popcorn flower (*Plagiobothrys* spp.), water pygmy-stonecrop (*Crassula aquatica*), annual hairgrass (*Deschampsia danthonioides*), purslane speedwell (*Veronica peregrina*), and toad rush (*Juncus bufonius*). Shallow vernal pools are often characterized by an abundance of nonnative grasses and forbs such as Mediterranean barley (*Hordeum marinum*) and hyssop-loosestrife (*Lythrum hyssopifolium*), but these areas also typically contain relatively high cover of native vernal pool plants such as coyote thistle (*Eryngium* spp.). Deeper parts of vernal pools are often characterized by creeping spikerush (*Eleocharis macrostachya*). The quality of vernal pools identified within the special-status plant species study area ranges from low quality where they occur in areas of inactive farmland to moderate quality where they occur in grazed California annual grassland. No high quality undisturbed vernal pools were identified within the wetland resource/habitat study areas.

Coastal and Valley Freshwater Marsh

Coastal and valley freshwater marsh includes sensitive wetland communities as identified on the List of California Terrestrial Natural Communities Recognized by the CNDDDB (CDFG 2003). As discussed in Table 4-2 and Section 4.1.2, this biological community is equivalent to the *Schoenoplectus californicus* Herbaceous alliance (Sawyer et al. 2009) and freshwater emergent wetland (Mayer and Laudenslayer 1988).

Freshwater marsh habitats are semi-permanently flooded areas that typically support perennial emergent vegetation such as cattails (*Typha* spp.), sedges (*Carex* spp.; *Schoenoplectus* spp.) and rushes (*Juncus* spp.). Freshwater marshes are found on floodplains, backwater areas, and within the channels of rivers and sloughs. Freshwater marshes are nontidal, flooded, depressional wetlands and are designated as palustrine emergent semi-permanently flooded wetlands (PEMF) in Cowardin (1979 et al.).

Inundated Nonwetlands

This habitat type is characterized by shallow depressions such as incidental scrapes, tire ruts, and artificial hardpans that have an ephemeral hydroperiod. The features are typically bare or sparsely vegetated; adventive native and nonnative species are associated with both vernal and upland habitats. Inundation is not of a sufficient duration to produce hydric soils and/or defined wetland vegetation under normal hydrological cycles. Therefore, these features are not identified as wetlands. Inundation may nevertheless be of sufficient duration to provide marginal breeding habitat for special-status vernal pool species such as vernal pool fairy shrimp and western spadefoot toad.

Constructed Basins

Constructed basins are included within the palustrine wetland class. These constructed basins are highly disturbed and may be routinely managed through vegetation removal and dredging. Depending on substrate and management regimes, vegetation type and presence varies. Hydrology is variable based on

precipitation events, irrigation inputs/removal, and other management objectives. These landscape or management features make-up the constructed basin wetland types described below.

Stormwater retention basins are generally excavated earthen basins that have been constructed to hold urban stormwater runoff. Most of the stormwater retention basins in the study area are associated with urban communities as well as commercial and industrial areas. Most of these basins are devoid of vegetation or support ruderal species that become established when the water levels are low or the basins are dry.

Reservoirs include variously sized basins that have been constructed to hold water for urban, industrial, or agricultural use. Water is generally either diverted or pumped into these areas and is held for use at a later time. Reservoirs are often lined to prevent or reduce water loss as a result of seepage into the soil and are generally devoid of vegetation.

Agricultural tail water ponds are generally small, relatively shallow basins that are excavated in the low corners or along the side of an agricultural field or orchard for the purpose of capturing excess irrigation water. Excess water is then either allowed to gradually seep into the soil or is pumped into a nearby canal feature. Vegetation within these basins is often comprised of ruderal wetland plant species such as Bermuda grass, tall flat sedge (*Cyperus eragrostis*), sprangletop (*Leptochloa* spp.), and fireweed (*Epilobium* spp.).

Other Waters

Nonwetland waters investigated in the special-status plant species study area include natural and constructed watercourses located within the Merced, Chowchilla, Madera, and Fresno watersheds, as shown on Figures 4-1 through 4-6. All natural and constructed watercourses are considered potentially jurisdictional under the Preliminary Jurisdictional Delineation (JD) format (USACE 2008). Natural drainage and constructed water features are discussed below with additional information located in the *Merced to Fresno Section Hydraulics and Floodplains Technical Report* (Authority and FRA 2011d) and in the *Merced to Fresno Section Wetland Delineation Report* (Authority and FRA 2011a).

Natural Watercourses

Historically, natural watercourses included riverine areas of the special-status plant species study area, including the perennial San Joaquin River, Bear Creek, and several intermittent to ephemeral sloughs and creeks. Most historically natural watercourses have ephemeral hydrology either because of their small watershed size or because they have been impounded or diverted upstream into other watercourses for agricultural purposes. All are low-gradient systems with emergent vegetation along margins of pool-run habitat units with bottom substrates dominated by fine sediments (i.e., sand, silt, or clay). Riffle and other fast-water habitats are uncommon.

Historically, natural watercourses have been influenced by the anthropogenic stressors affecting streams elsewhere in the San Joaquin Valley, such as agricultural land conversions of floodplains and associated water diversions combined with more than a century of exotic fish and invertebrate introductions (McBain and Trush 2002). For example, recent fish sampling on the San Joaquin River in the regional area and immediately upstream and downstream of the special-status plant species study area yielded at least 10 nonnative fishes among 14 taxa, none of which were identified as special-status fishes (CDFG 2007). Agricultural and municipal watercourses could potentially support special-status species for short time periods, but these watercourses usually represent “false pathways”¹ for native fishes and are typically dominated by nonnative fishes that prey on or outcompete natives. For these reasons, special-status fishes were presumed to potentially occur only in historical natural watercourses. While many

¹ As described by McBain and Trush (2002), false pathways lead fish away from the life history trajectory (pathway) that will otherwise allow it to survive, grow, and complete its life cycle. False pathways affect both upstream and downstream fish movement. During upstream movement, flow may attract fish into drains and bypasses that do not provide habitat because spawning substrate or cover, food availability, water temperatures, dissolved oxygen concentrations, salinity, and other environmental conditions are unsuitable.

watercourses are now inhabited by primarily nonnative species, many native fish species still persist in the basin (Moyle 2002).

Constructed Watercourses

Constructed watercourses include linear water features such as canals and drains that have been constructed primarily for the conveyance of agricultural irrigation water. Canals range in size from small, shallow ditches (10 feet wide and 3 feet deep) to broad channels as much as 50 feet wide and 10 feet deep. Emergent vegetation as well as ruderal wetland species may occur in some areas, but many of the canals are routinely cleared of vegetation or treated with herbicide. A number of the canals convey water diverted from and discharge water into the natural drainage features described in the natural watercourse section above. Constructed waterways within the study area are considered potentially jurisdictional under the Preliminary JD format (USACE 2008).

4.1.2.3 Special-Status Plant Communities

Special-status plant communities on the List of California Terrestrial Natural Communities Recognized by the CNDDDB (CDFG 2009) and identified as potentially occurring in the regional area based on CNDDDB (2003a, 2003b, 2003c) search results include Great Valley mixed riparian forest, northern claypan vernal pool, valley sacaton grassland, and sycamore alluvial woodland. In addition, two natural communities tracked by the CNDDDB were included in the database search for the regional area, including coastal and valley freshwater marsh and valley sink scrub. These CWHR habitat types identified as sensitive or as having a high inventory priority and determined to occur in the regional area are listed in Table 4-3. Figures 4-1 through 4-6 show the location of known CNDDDB sensitive communities for plants. For purposes of this discussion, the term “sensitive” reflects terrestrial and aquatic plant communities that have been recognized as significant, represent a rare vegetation type, have limited distribution, and/or are recognized as such by CDFG. These communities are also recognized as applicable to CEQA significance criteria so that if affected, a significant impact would occur.

Table 4-3
Sensitive Biological Communities Occurring in the Special-Status Plant Species Study Area

CDFG WHR (1988)	Sawyer et al. (2009)	Holland (1986)	Identified as High Inventory Priority by CDFG	
			Note ^a	Note ^b
Freshwater Emergent Wetland ^c	Schoenoplectus acutus Alliance	Coastal and Valley Freshwater Marsh	No	No
	Hardstem Bulrush Marsh			(Rank G5/S4)
	Schoenoplectus californicus Alliance	Coastal and Valley Freshwater Marsh	Yes	No
	California Bulrush Marsh			(Rank G5/S4?)
	Typha (agustifolia, domingensis, latifolia) Alliance	Coastal and Valley Freshwater Marsh	No	No
	Cattail Marshes			(Rank G5/S5)
Annual Grassland	N/A – To be classified during spring field surveys	Northern Claypan Vernal Pool and Northern Hardpan Vernal Pool	Yes	N/A Global and State rankings to be determined after spring surveys and classifications completed.

CDFG WHR (1988)	Sawyer et al. (2009)	Holland (1986)	Identified as High Inventory Priority by CDFG	
			Note ^a	Note ^b
Cottonwood-Willow Riparian ^c	Populus Fremontii Forest Alliance	Great Valley Cottonwood Riparian Forest	Yes	Yes (Rank G4/S3)
Willow Riparian Forest and Woodland ^c	Salix Lasiolepis Shrubland Alliance	Central Coast Arroyo Willow Riparian	Yes	No (Rank G4/S4)
Mixed Riparian Forest and Woodland ^c	Jugland hindsii; Hybrids Special; and Semi-Natural Woodland Stands	Great Valley Mixed Riparian Forest	Yes	Yes (Rank G1/S1)
Valley Oak Riparian Forest and Woodland ^c	Valley Oak Woodland Alliance	Great Valley – Valley Oak Riparian Forest	Yes	Yes (Rank G2/S2)

^a Community identified in the *Vegetation Classification and Mapping Program: List of California Terrestrial Natural Communities Recognized by the California Natural Diversity Database* (CDFG 2003) as a special vegetation type either known or believed to be high priority for inventory in the CNDDB.

^b Community identified on the *Vegetation Classification and Mapping Program: List of California Vegetation Alliances* (CDFG 2009b) as a high priority for inventory. The conservation status is designated as 1 to 5, preceded by a letter reflecting the appropriate geographic scale of the assessment (G = Global, N = National, and S = Subnational). The numbers have the following meaning:
1 = critically imperiled; 2 = imperiled; 3 = vulnerable; 4 = apparently secure; 5 = secure.

^c Vegetation community may also be subject to federal and/or state regulations protecting wetland and riparian areas.

Three of these communities were identified during reconnaissance-level habitat mapping surveys and are described above under the corresponding CWHR habitat classification descriptions (i.e., Great Valley mixed riparian forest is equivalent to both cottonwood-willow riparian and mixed riparian forest and woodland; vernal pool is described under California annual grassland; and coastal and valley freshwater marsh is equivalent to freshwater emergent wetland). The three remaining sensitive biological communities identified in the regional area but not in the special-status plant species study area (i.e., valley sacaton grassland, valley sink scrub, and sycamore alluvial woodland) are described in the following sections.

Valley Sacaton Grassland

Valley sacaton grassland is characterized by mid-height tussock-forming grassland dominated by alkali sacaton (*Sporobolus airoides*). This natural community was formerly extensive in the Tulare Lake Basin and along the San Joaquin Valley north to Stanislaus and Contra Costa counties; however, its distribution is currently much reduced. Site factors include fine-textured, poorly drained, usually alkaline soils. Most sites have seasonally high water tables or are inundated during winter flooding.

Valley Sink Scrub

The valley sink scrub community formerly surrounded the large San Joaquin Valley lakes (Kern, Buena Vista, Tulare, and Goose) and ran north along the trough of the San Joaquin Valley through Merced County to the grasslands of the Sacramento Valley (Solano to Glenn County, west of the Sacramento River); however, this community is now essentially extirpated due to flood control, agricultural developments, and groundwater pumping. It is characterized by low, open to dense succulent shrublands dominated by alkali-tolerant plants in the Chenopodiaceae family, especially iodinebush (*Allenrolfea occidentalis*) or several seepweed (*Suaeda*) species. Understory vegetation in this community is usually

lacking, although sparse herbaceous cover dominated by foxtail chess (*Bromus madritensis* ssp. *rubens*) occasionally develops. Site factors include heavy saline and/or alkaline clays of lakebeds or playas. High groundwater provides capillary water for the perennials in this community. Soil surfaces often have a brilliant, white, salty crust over dark, sticky clay.

Sycamore Alluvial Woodland

Sycamore alluvial woodland is open to moderately closed, winter-deciduous, broad-leaved riparian woodland overwhelmingly dominated by well-spaced California sycamore. Species in the subcanopy include widely-spaced buckeye (*Aesculus californica*) and elderberry (*Sambucus mexicana*). The understory usually consists of grasses. This woodland community is generally found adjacent to intermittent streams that rely on rainfall rather than snowmelt. It is found in the South Coast Ranges from Alameda to Santa Barbara counties.

4.1.2.4 Designated Critical Habitat

Designated critical habitats are geographic areas currently occupied and providing essential habitat for one or more federally-listed threatened or endangered species. Under the federal ESA, conservation is defined as “any and all methods and procedures used to bring a species to recovery; the point at which the protections of the federal ESA are no longer needed” (3(3), 16 U.S.C. § 1532(2)).

Critical habitat is designated for 10 species within the regional area. Critical habitat for the following two species is present within the special-status plant species study area along the BNSF alignment near the community of Le Grand in Merced County: succulent owl's clover (*Castilleja campestris* ssp. *succulenta*) and San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*). Critical habitat for Hoover's spurge (*Chamaesyce hooveri*) and hairy Orcutt grass (*Orcuttia pilosa*) has been designated in the regional area but does not occur within the special-status plant species study area.

5.0 Results: Special-Status Plant Species, Impacts

5.1 Results from the Prefield Investigations

The prefield investigation database and literature review identified a total of 36 special-status plant species that are reported or are expected to occur in the vicinity of the Merced to Fresno Section based upon potentially suitable habitat. Of these 36 species, the database review identified 12 plant species listed as threatened or endangered under ESA or CESA, as well as an additional 18 plant species considered rare, threatened, or endangered throughout their range (CNPS list 1B) but that have not been formally listed (Appendix A). The remaining 6 plant species include those that are considered to be extinct in California (CNPS 1A); rare in California but more common elsewhere (CNPS list 2), or additional information is needed to determine the conservation status (CNPS list 3).

Appendix A lists a total of 20 CNDDDB occurrences of 16 special-status plant species occurrences within the plant study area. Most of the occurrences listed are historic (occurring between 1893 and 1955), have vague location data, are mapped broadly as occurring in regional areas (i.e., city of Fresno), and many are mapped in areas that have largely been converted to urban and agricultural uses. Although many of these species' occurrences are listed by CNDDDB as "presumed extant," (including a list 1A species [considered extinct in California]), most of these occurrences need to be verified in the field. For six species, at least one occurrence or location listed is more current and provides more detailed location and habitat information. The six species are: spiny-sealed button celery (*Eryngium spinosepalum*), San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene's tuctoria, palmate-bracted bird's beak, and succulent owl's clover. However, even some of these six species' occurrence information is not well documented (i.e., no population size, no observance since 1980s, etc).

5.2 Results from Field Surveys and Habitat Assessment

5.2.1 March 2011 Survey Effort

During the March 2011 survey effort, no special-status plant populations were located. However, 27 of the 100 parcels surveyed were determined to have the potential to support special-status plant species because suitable habitat features were present. Suitable habitat was documented for the following species: recurved larkspur, dwarf downingia, Boggs Lake hedge-hyssop (*Gratiola heterosepala*), California satintail (*Imperata brevifolia*), Munz's tidy-tips (*Layia munzii*), little mousetail, pincushion navarretia, and Sanford's arrowhead (*Sagittaria sanfordii*). The suitable habitat features for these species include vernal pools, alkaline soils, streamsides, and canals. The parcels surveyed during the March 2011 field effort are depicted in Appendix D. Copies of the March 2011 APN survey data and field survey forms are included in Appendix E.

The vernal pools that were located were often of a ruderal nature, invaded by nonnative species including *Hordeum* sp., ripgut brome, and soft chess (*Bromus hordeaceus*). However, many still have the potential to support several sensitive plant species, specifically dwarf downingia, Boggs Lake hedge-hyssop, little mousetail, and pincushion navarretia. It was determined that several of the grasslands with alkaline soils that were not recently disturbed have the potential to support recurved larkspur and Munz's tidy-tips. Several of the streamsides and riversides within the project area have the potential to support California satintail and Sanford's arrowhead. California satintail tends to grow along ditch and canal margins. Sanford's arrowhead is known to grow in canals, ditches, and ponds with standing water.

Table 5-1 shows the numbers of each habitat type that were documented during the March 2011 survey effort. The most frequently encountered habitat type was ruderal, with 18 APNs, followed by canal and commercial, with 14 and 13 APNs, respectively. The purpose of the table is to provide context for the status of the landscape within the special-status plant study area. A list of all plant species observed in the project area to date is included in Appendix F.

Table 5-1
Observed Habitat Types (March 2011)

Study Area Habitat Type	Field Habitat Type	Number of APNs
Agricultural	Dry land grain crops	3
	Irrigated grain and seed crops	1
	Inactive farmland	6
	Rural residential	5
	Vineyard	1
Developed areas	Residential	4
	Urban	1
	Commercial	13
	Roadway	2
	Railway	2
	Barren	5
California annual grassland	California annual grassland	2
Great Valley mixed riparian forest	Mixed riparian forest and woodland	4
Other riparian	Willow riparian forest and woodland	2
	Black walnut riparian	3
	Arundo	4
Eucalyptus woodlands	Eucalyptus	1
Ruderal vegetation	Ruderal vegetation	18
Vernal pools and other seasonal wetlands	Seasonal wetland	1
	Vernal pool	1
Fremont cottonwood forested wetland	Palustrine forested wetland	1
Natural watercourses	Riverine	5
Constructed watercourses	Tailwater pond	1
	Canal	14

5.2.2 April 2011 Survey Effort

During the April 2011 survey effort, no special-status plant populations were located. However, 37 of the 106 parcels surveyed were determined to have the potential to support special-status plant species because suitable habitat features were present. Suitable habitat was documented for the following species: recurved larkspur, dwarf downingia, Boggs Lake hedge-hyssop, California satintail, Munz's tidy-tips, little mousetail, pincushion navarretia and Sanford's arrowhead. Similar to the March survey effort, the suitable habitat features for these species include vernal pools, alkaline soils, streamsides, and canals. The parcels surveyed during the April 2011 field effort are depicted in Appendix D. Copies of the April 2011 APN survey data and field survey forms are included in Appendix E.

Table 5-2 shows the numbers of each habitat type that were documented during the April 2011 survey effort. The most frequently encountered habitat type was ruderal, with 23 APNs, followed by canal, commercial, and vernal pool, with 15, 13, and 11 APNs, respectively.

Table 5-2
Observed Habitat Types (April 2011)

Study Area Habitat Type	Field Habitat Type	Number of APNs
Agricultural	Pasture	1
	Irrigated grain and seed crops	2
	Irrigated field and row crop	1
	Inactive farmland	1
	Rural residential	3
	Vineyard	1
Developed areas	Residential	2
	Commercial	13
	Roadway	2
	Railway	1
	Barren	3
California annual grassland	California annual grassland	5
Great Valley mixed riparian forest	Mixed riparian forest and woodland	3
Other riparian	Willow riparian forest and woodland	2
	Black walnut riparian	4
	Cottonwood willow riparian	2
Ruderal vegetation	Ruderal vegetation	23
Coastal and Valley freshwater marsh	Freshwater emergent wetland	1
Vernal pools and other seasonal wetlands	Seasonal wetland	1
	Vernal pool	11
Fremont cottonwood forested wetland	Palustrine forested wetland	3

Study Area Habitat Type	Field Habitat Type	Number of APNs
Natural watercourses	Riverine	1
Constructed watercourses	Retention Basin	5
	Canal	15

5.2.3 May 2011 Survey Effort

During the May 2011 survey effort, no special-status plant populations were located. However, 22 of the 110 parcels surveyed were determined to have the potential to support special-status plant species because suitable habitat features were present. Suitable habitat was documented for the following species: recurved larkspur, dwarf downingia, Boggs Lake hedge-hyssop, California satintail, Munz's tidy-tips, little mousetail, pincushion navarretia, and Sanford's arrowhead. As with the March and April 2011 survey efforts, the suitable habitat features for these species include vernal pools, alkaline soils, streamsides, and canals. The parcels surveyed during the May 2011 field effort are depicted in Appendix D. Copies of the May 2011 APN survey data and field survey forms are included in Appendix E.

Table 5-3 shows the numbers of each habitat type that were documented during the May 2011 survey effort. The most frequently encountered habitat type was canal, with 21 APNs, followed by ruderal and commercial, with 19 and 12 APNs, respectively.

Table 5-3
Observed Habitat Types (May 2011)

Study Area Habitat Type	Field Habitat Type	Number of APNs
Agricultural	Deciduous orchard	1
	Fallow	2
	Irrigated grain and seed crops	1
	Irrigated field and row crops	2
	Irrigated hay crops	1
	Inactive farmland	2
	Pasture	2
	Rural residential	4
	Vineyard	2
Developed areas	Residential	5
	Commercial	12
	Roadway	1
	Railway	1
	Barren	1
California annual grassland	California annual grassland	2

Study Area Habitat Type	Field Habitat Type	Number of APNs
Other riparian	Willow riparian forest and woodland	5
	Cottonwood willow riparian	4
	Black walnut riparian	1
	Arundo	4
Ruderal vegetation	Ruderal vegetation	19
Coastal and valley freshwater marsh	Freshwater emergent wetland	1
Vernal pools and other seasonal wetlands	Seasonal wetland	3
	Vernal pool	6
Natural watercourses	Riverine	4
Constructed watercourses	Retention basin	2
	Canal	21

5.3 Special-Status Plant Species

Descriptions of the 36 special-status plant species determined to have moderate or high potential to occur in the special-status plant study area are provided in this section. Reference to suitable habitat for each species is also discussed as related to the habitat encountered during field surveys. Figures 4-1 through 4-6 show the location of special-status species observed or reported in the special-status plant species study area, and Appendix G provides photographs of special-status plant species observed.

5.3.1 Henderson's Bent Grass (*Agrostis hendersonii*)

Henderson's bent grass, a CNPS List 3.2 species, is an erect, loosely tufted member of the grass family (*Poaceae*). It grows between 2.4 and 27.6 inches tall and is characterized by smooth leaf sheaths and 0.5- to 2-inch greenish to yellowish spikelets tinged with purple at the tips. It blooms from April to June (Hickman 1993).

Henderson's bent grass grows along the wet margins of vernal pools, on thin, vernal moist soils and in other seasonal wetlands associated with valley and foothill annual grasslands at elevations from 230 to 1,000 feet above mean sea level (amsl). Henderson's bent grass is found in Calaveras, Merced, Shasta, Tehama, and Tuolumne counties. Habitat loss resulting from development poses the greatest threat to existing populations (CNPS 2009).

The nearest reported and presumed extant CNDDB occurrence of Henderson's bent grass is located approximately 8 miles north of the special-status plant species study area (Occurrence #15, CNDDB 2003a, 2003b, 2003c).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality vernal pools and California annual grassland are present within the special-status plant species study area; therefore, Henderson's bent grass has a moderate potential to occur in these habitat types.

5.3.2 Alkali Milk-Vetch (*Astragalus tener* variation [var.] *tener*)

Alkali milk-vetch, a CNPS List 1B.2 species and California endemic, is an annual herb in the pea family (*Fabaceae*) that grows from 1.5 to 12 inches tall. The leaflets are variable, from narrow and pointed to

wedge-shaped with blunt or notched tips. The fruit is 0.4 to 1.0 inch long, straight or only slightly curved with a rounded base. This species blooms from March to June (Hickman 1993).

Alkali milk-vetch is associated with alkaline soils in vernal pool grassland complexes and playas at elevations between 3 and 560 feet amsl. This species is found in Alameda, Contra Costa, Merced, Monterey, Napa, San Benito, Santa Clara, San Francisco, San Joaquin, Solano, Sonoma, Yolo, and Stanislaus counties. Habitat loss resulting from development, overgrazing, agriculture, and displacement by nonnative species poses the greatest threat to existing populations (CNPS 2009).

One CNDDDB reported occurrence of alkali milk-vetch is near the Arena Plains National Wildlife Refuge, approximately 9 miles southwest of the special-status plant species study area (Occurrence #55; CNDDDB 2009, 2010). This population is recorded as last seen in 2002 (CNDDDB 2003a, 2003b, 2003c) and is presumed to be extant.

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality California annual grassland and vernal pools are present within the special-status plant species study area; therefore, alkali milk-vetch has a moderate potential to occur in these habitat types.

5.3.3 Heartscale (*Atriplex cordulata*)

Heartscale, a CNPS List 1B.2 species, is an annual herb in the goosefoot family (*Chenopodiaceae*). It grows from 3.8 to 20 inches tall and has small, heart-shaped, gray leaves and small, reddish, ovate fruit bracts that are less than 0.5 inch across. This species blooms from April to October (Hickman 1993).

Heartscale is associated with sandy and alkaline soils in chenopod scrub, meadows and seeps, and valley and foothill grasslands at elevations from 0 to 1,000 feet amsl. This species occurs in Alameda, Butte, Colusa, Fresno, Glenn, Kern, Madera, Merced, San Joaquin, Solano, San Luis Obispo, Stanislaus, Tulare, and Yolo counties. Habitat loss resulting from development, agriculture, displacement by nonnative plants, and trampling poses the greatest threat to existing populations (CNPS 2009).

Two CNDDDB-reported historic locations for heartscale occur within the special-status plant species study area. One (Occurrence #18) is reported along Avenue 21 and Road 16 and the other (Occurrence #19) is reported nearby in the vicinity of Avenue 22 and Robertson Boulevard. Both populations are recorded as last seen in 1937 and are reported as extirpated (CNDDDB 2009, 2010, 2011). The nearest presumed extant CNDDDB occurrence of heartscale is 4 miles southwest of the special-status plant species study area (Occurrence #15, CNDDDB 2003a, 2003b, 2003c).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality California annual grassland is present within the special-status plant species study area; therefore, heartscale has a moderate potential to occur in this habitat type.

5.3.4 Brittscale (*Atriplex depressa*)

Brittscale, a CNPS List 1B.2 species, is an annual herb in the goosefoot family (*Chenopodiaceae*). It grows 4 to 8 inches tall and has ovate to cordate white, scaly leaves and small, ovate reddish fruit bracts that are less than 0.5 inch across. This species blooms from April to October (Hickman 1993).

Brittscale is found on clay and alkaline soils in chenopod scrub, meadows and seeps, and valley and foothill grasslands at elevations from 0 to 660 feet amsl. This species is found throughout northern California as well as in Merced, Fresno, King, and Tulare counties. Habitat loss resulting from development, agriculture, displacement from nonnative plants, and trampling poses the greatest threat to existing populations (CNPS 2009).

The CNDDDB reports no occurrences of brittscale within 10 miles of the special-status plant species study area (CNDDDB 2003a, 2003b), but five occurrences have been reported within the regional vicinity

(outside of the regional area), all of which are located in Fresno County near the town of Kerman (CNDDDB 2003a, 2003b, 2003c). All five populations are presumed to be extant (Occurrences #34, #35, #36, #37, and #73; CNDDDB 2003a, 2003b, 2003c).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality California annual grassland and vernal pools are present within the special-status plant species study area; therefore, brittlescale has a moderate potential to occur in these habitat types.

5.3.5 San Joaquin Spearscale (*Atriplex joaquiniana*)

San Joaquin spearscale, a CNPS List 1B.2 species and a California endemic, is an annual herb in the goosefoot family (*Chenopodiaceae*). It grows from 3.8 to 36 inches tall and has ovate to triangular leaves that are 0.4 to 2.7 inches long. The reddish purple fruit bracts are congested on the ends of the main stem and branches. This species blooms from April to October (Hickman 1993).

San Joaquin spearscale occurs on alkaline soils in chenopod scrub, alkali meadows and seeps, and valley and foothill grasslands at elevations from 3 to 825 feet amsl. This species is found in Alameda, Contra Costa, Colusa, Fresno, Glenn, Merced, Monterey, Napa, San Benito, Santa Clara, San Joaquin, Solano, San Luis Obispo, Tulare, and Yolo counties. Habitat loss resulting from development, agriculture, and overgrazing poses the greatest threat to existing populations (CNPS 2009).

The nearest reported CNDDDB occurrence of San Joaquin spearscale is located in the vicinity of the intersection of Bear Creek and East Side Canal, approximately 10 miles from the special-status plant species study area. This population was last seen in 1996 and is presumed to be extant (Occurrence #74; CNDDDB 2003a, 2003b, 2003c).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality California annual grassland is present within the special-status plant species study area; therefore, San Joaquin spearscale has a moderate potential to occur in this habitat type.

5.3.6 Lesser Saltscale (*Atriplex minuscula*)

Lesser saltscale, a CNPS List 1B.1 species and a California endemic, is an annual herb in the goosefoot family (*Chenopodiaceae*). Lesser saltscale has many upright, reddish stems up to 16 inches tall. The leaves are egg-shaped with entire margins and are typically opposite on the upper branches and alternate on the lower part of the stem. Each fruit consists of a single reddish seed that is enclosed by two egg- to diamond-shaped bracts covered with tubercles (wart-like projections). This species blooms from May to October (Hickman 1993).

Lesser saltscale is found on sandy and alkaline soils in chenopod scrub, playas, and valley and foothill grasslands at elevations from 130 to 330 feet amsl. This species is found in Butte, Fresno, Kern, Madera, Merced, Tulare, and Stanislaus counties. Habitat loss resulting from development, agriculture, and overgrazing poses the greatest threat to existing populations (CNPS 2009).

Three historic CNDDDB occurrences of lesser saltscale are recorded within the special-status plant species study area, all located approximately 4 miles south of Chowchilla (Occurrences #25, #26, and #27; CNDDDB 2003a, 2003b, 2003c). These populations were last reported observed between 1921 and 1937 (CNDDDB 2003a, 2003b, 2003c). The three occurrences are recorded by CNDDDB as presumed extant; however, based on review of recent aerial imagery, the habitat at the reported locations for these populations has been converted to agricultural uses and residential development (Google Earth 2010).

Because an extant occurrence of this species has been reported and potentially suitable California annual grassland is present within the special-status plant species study area, lesser saltscale has a high potential to occur in this habitat type.

5.3.7 Vernal Pool Smallscale (*Atriplex persistens*)

Vernal pool smallscale, a CNPS List 1B.2 species and a California endemic, is an annual herb in the goosefoot family (*Chenopodiaceae*). The long, upright stems grow from 4.0 to 8.0 inches tall. It has alternate, sessile, gray, egg-shaped leaves with smooth margins that are 0.08 to 0.16 inch long. Each fruit consists of a single, reddish-brown seed enclosed by two bracts. This species blooms from June to October (Hickman 1993).

Vernal pool smallscale is found in vernal pools associated with alkaline soils at elevations between 26 and 345 feet amsl. This species occurs in Glenn, Madera, Merced, Solano, Tulare, and Stanislaus counties. Habitat loss resulting from development, agriculture, and flood control activities poses the greatest threat to existing populations (CNPS 2009).

One historic CNDDDB occurrence for vernal pool smallscale has been reported 3 miles southwest of Merced, approximately 2 miles south of the special-status plant species study area (Occurrence #7; CNDDDB 2003a, 2003b, 2003c). This population was last reported in 1926 and is recorded as possibly extirpated. Based on review of recent aerial imagery, potential habitat may exist at the reported location; however, the immediate surrounding area has been converted to agricultural uses (Google Earth 2010). The nearest presumed extant occurrence is located 6.6 miles southwest of the wetlands special-status plant species study area (Occurrence #3; CNDDDB 2009, 2010, 2011).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality vernal pools are present within the special-status plant species study area; therefore, vernal pool smallscale has a moderate potential to occur in these habitat types.

5.3.8 Subtle Orache (*Atriplex subtilis*)

Subtle orache, a CNPS List 1B.2 species and a California endemic, is an annual herb in the goosefoot family (*Chenopodiaceae*). It has upright stems between 9 and 12 inches tall. The heart-shaped, white, scaly leaves are generally opposite and less than 0.1 inch long. This species blooms from June to August (Hickman 1993).

Subtle orache grows on sandy and alkaline soils in valley foothill grasslands at elevations between 120 and 330 feet amsl. Subtle orache is found in Butte, Fresno, Kings, Kern, Madera, Merced, and Tulare counties. Habitat loss resulting from development, overgrazing, and agriculture poses the greatest threat to existing populations (CNPS 2009).

Subtle orache has been reported in only 25 locations, including one historic population located 0.1 mile north of the special-status plant species study area, approximately 4 miles southwest of Chowchilla along Robertson Boulevard (Occurrence #4; CNDDDB 2003a, 2003b, 2003c). This population was last reported in 1936 and is listed as presumed extant. Based on review of recent aerial imagery, the habitat at the reported location has been entirely converted to agriculture (Google Earth 2010).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality California annual grassland is present within the special-status plant species study area; therefore, subtle orache has a high potential to occur in this habitat type.

5.3.9 Lost Hills Crownscale (*Atriplex vallicola*)

Lost Hills crownscale, a CNPS List 1B.2 species, is an annual herb in the goosefoot family (*Chenopodiaceae*). The short stems have few branches and alternate, egg-shaped leaves with entire margins. The fruit bracts are broadly triangular, irregularly toothed, and may or may not have tubercles (warty projections). Each pair of bracts encloses a flattened, dark brown seed. This species blooms from April to August (Hickman 1993).

Lost Hills crownscale grows on alkaline soils in chenopod scrub, valley, and foothill grasslands and is associated with vernal pools at elevations ranging from 0 to 2,000 feet amsl. This species is found in Fresno, Kings, Kern, Merced, and San Luis Obispo counties. Habitat loss resulting from overgrazing, agriculture, and energy projects poses the greatest threat to existing populations (CNPS 2009).

The CNDDDB reports no occurrences within 10 miles of the special-status plant species study area (CNDDDB 2003a, 2003b, 2003c). Currently, this species is known from Lost Hills to extreme southern Kings County, the Kerman Ecological Reserve in Fresno County, the Soda Lake region of the Carrizo Plain, the Lokern-McKittrick area of Kern County, and southwestern Merced County (USFWS 1998).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality California annual grassland and vernal pools are present within the special-status plant species study area; therefore, Lost Hills crownscale has a moderate potential to occur in these habitat types.

5.3.10 Hoover's Calycadenia (*Calycadenia hooveri*)

Hoover's calycadenia, a CNPS List 1B.3 species, is an annual herb endemic to California in the sunflower family (*Asteraceae*). This species grows to a height of 3.9 to 23.6 inches with spike-like flower heads on terminal branchlets with 1 to 4 flowers per node. It blooms from July to September (Hickman 1993).

Hoover's calycadenia is found in cismontane woodland and valley and foothill grasslands, often on barren, rocky, exposed substrate at elevations between 215 and 860 feet amsl. Hoover's calycadenia is found in Calaveras, Madera, Merced, Mariposa, and Stanislaus counties. Habitat loss resulting from development, overgrazing, and agriculture poses the greatest threat to existing populations (CNPS 2009).

The nearest reported CNDDDB occurrence of Hoover's calycadenia is located 5 miles northeast of the special-status plant species study area (Occurrence #14; CNDDDB 2003a, 2003b, 2003c).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable California annual grassland is present within the special-status plant species study area; therefore, Hoover's calycadenia has a moderate potential to occur in California annual grassland within the project footprint.

5.3.11 Succulent Owl's-clover (*Castilleja campestris* ssp. *succulenta*)

Succulent owl's-clover is a federally threatened, state endangered, and CNPS List 1B.2 species. It is an annual herb in the snapdragon family (*Scrophulariaceae*). It grows 4 to 12 inches tall and has spear-shaped leaves with smooth edges. Inflorescences are spike-like with green spear-shaped bracts that are generally larger than the deep yellow to orange flowers. It blooms from April to May (Hickman 1993).

Succulent owl's-clover grows on acidic soils in vernal pool grassland complexes at elevations between 160 and 2,400 feet amsl. Succulent owl's-clover is found in Fresno, Madera, Merced, Mariposa, San Joaquin, and Stanislaus counties. Habitat loss, resulting from development, agriculture, overgrazing, and trampling, poses the greatest threat to existing populations (CNPS 2009).

Succulent owl's clover is presumed extant within the special-status plant species study area (Occurrence #62; CNDDDB 2003a, 2003b, 2003c). Designated critical habitat for this species is also present within the special-status plant species study area.

Succulent owl's clover has a high potential to occur in the special-status plant species study area due to a presumed extant occurrence and potentially suitable habitat in California annual grassland and vernal pools.

5.3.12 Hoover's Spurge (*Chamaesyce hooveri*)

Hoover's spurge, a federally threatened and CNPS List 1B.2 species, is an annual herb in the spurge family (*Euphorbiaceae*). Hoover's spurge has a prostrate growth, reaching only 2.0 inches tall. Its flower has petal-like glands that are red to olive in color. This species blooms from July to October (Hickman 1993).

Hoover's spurge grows on volcanic basalt or clay substrates in vernal pool grassland complexes at elevations between 75 and 400 feet amsl. This species is found in Butte, Colusa, Glenn, Merced, Tehama, Tulare, and Stanislaus counties. Habitat loss resulting from development, overgrazing, agriculture, and nonnative species poses the greatest threat to existing populations (CNPS 2009).

The nearest reported CNDDDB occurrence for Hoover's spurge is located 4 miles northwest of Merced, approximately 9.6 miles from the special-status plant species study area. This population was last seen in 1987 and is presumed to be extant (Occurrence #22; CNDDDB 2003a, 2003b, 2003c). Based on review of recent aerial imagery, habitat at this location may be present for this species (Google Earth 2010). Critical habitat for Hoover's spurge has been designated but does not occur in the special-status plant species study area or regional area; the closest designated critical habitat is approximately 192 miles from the special-status plant species study area.

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality California annual grassland is present within the special-status plant species study area; therefore, Hoover's spurge has a moderate potential to occur in this habitat type.

5.3.13 Beaked Clarkia (*Clarkia rostrata*)

Beaked clarkia, a CNPS List 1B.3 species, is an annual herb in the evening primrose family (*Onagraceae*). It grows 14 to 24 inches tall and has linear leaves and short petioles. Its small, pendent buds are recurved at the tip, and the hypanthium has a ring of hairs. The fan-shaped, pinkish-lavender petals fade to white near the middle. This species blooms from April to May (Hickman 1993).

Beaked clarkia grows in cismontane woodlands and valley and foothill grasslands at elevations between 180 and 1,550 feet amsl. This species is found in Merced, Mariposa, Tuolumne, and Stanislaus counties. Habitat loss resulting from development, overgrazing, and agriculture poses the greatest threat to existing populations (CNPS 2009).

The nearest presumed extant CNDDDB occurrence of beaked clarkia is located approximately 5 miles northeast of the special-status plant species study area (Occurrence #2; CNDDDB 2003a, 2003b, 2003c).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality California annual grassland is present within the special-status plant species study area; therefore, beaked clarkia has a moderate potential to occur in this habitat type.

5.3.14 Palmate-Bracted Bird's-Beak (*Cordylanthus palmatus*)

Palmate-bracted bird's-beak is a federally and state endangered and CNPS List 1B.1 species. It is an annual hemiparasitic herb in the snapdragon family (*Scrophulariaceae*) that grows 4 to 12 inches tall. The stems and leaves are grayish green and sometimes covered with salt crystals excreted by glandular hairs. Small, pale whitish flowers are 0.5 to 1 inch long and arranged in dense clusters surrounded by leaf-like bracts. It blooms from May to October (Hickman 1993).

Palmate-bracted bird's-beak grows on alkaline soils in chenopod scrub and valley and foothill grasslands, at elevations between 15 and 515 feet amsl. Palmate-bracted bird's-beak is found in Alameda, Colusa, Fresno, Glenn, Madera, San Joaquin, and Yolo counties. Habitat loss resulting from development,

agriculture, overgrazing, vehicles, and altered hydrology poses the greatest threat to existing populations (CNPS 2009).

The nearest presumed extant CNDDDB occurrence of palmate-bracted birds-beak is located approximately 8 miles southeast of the special-status plant species study area.

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality California annual grassland is present within the special-status plant species study area; therefore, palmate-bracted bird's-beak has a moderate potential to occur in this habitat type.

5.3.15 Recurved Larkspur (*Delphinium recurvatum*)

Recurved larkspur, a CNPS List 1B.2 species and a California endemic, is a perennial herb in the buttercup family (*Ranunculaceae*). It grows 7 to 34 inches tall with basal leaves characterized by 3 to 11 lobes. The inflorescence is a 0.25- to 2.25-inch-long raceme with 10 to 25 flowers. Flowers consist of five light blue sepals and four white petals. Fruit are follicles with winged seeds. It blooms from March to June (Hickman 1993).

Recurved larkspur grows on poorly drained, alkaline soils in chenopod scrub, saltbush scrub, valley sink scrub, cismontane woodland, and valley and foothill grassland elevations between 100 and 2,000 feet amsl. Recurved larkspur is found in Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kings, Kern, Madera, Merced, Monterey, San Joaquin, San Luis Obispo, Solano, and Tulare counties. Habitat loss, resulting from development, agriculture, overgrazing, and trampling, poses the greatest threat to existing populations (CNPS 2009).

The CNDDDB reports one occurrence of recurved larkspur in the special-status plant species study area located approximately 8 miles west of Chowchilla. This population was last reported in 1955 and is currently reported as possibly extirpated (Occurrence #77; CNDDDB 2003a, 2003b, 2003c). Based on review of recent aerial imagery, the reported location has been converted to agriculture (Google Earth 2010). The nearest reported extant CNDDDB occurrence is located approximately 5 miles west of the special-status plant species study area (Occurrence #78; CNDDDB 2003a, 2003b, 2003c).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality California annual grassland is present within the special-status plant species study area; therefore, recurved larkspur has a moderate potential to occur in this habitat type.

5.3.16 Dwarf Downingia (*Downingia pusilla*)

Dwarf downingia, a CNPS List 2.2 species, is an annual herb in the bellflower family (*Campanulaceae*). It is 1.2 to 3.2 inches tall with small linear leaves and small, radially symmetric flowers less than 2.5 inches across. The flowers are variable and may be all white or blue with two small yellow spots near the throat. This species blooms from March to May (Hickman 1993).

This species is found in vernal pools, vernal lakes, and mesic valley and foothill grasslands at elevations between 3 and 1,600 feet amsl. Dwarf downingia is found in Fresno, Merced, Napa, Placer, Sacramento, San Joaquin, Solano, Sonoma, Stanislaus, Tehama, and Yuba counties. Habitat loss resulting from development, agriculture, recreational activities, and nonnative plants poses the greatest threat to existing populations (CNPS 2009).

The nearest presumed extant CNDDDB occurrence of dwarf downingia is located approximately 3 miles northeast of the special-status plant species study area (Occurrence #109; CNDDDB 2003a, 2003b, 2003c).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality vernal pools are present within the special-status plant species study area; therefore, dwarf downingia has a moderate potential to occur in this habitat type.

5.3.17 Delta Button-Celery (*Eryngium racemosum*)

Delta button-celery, a state endangered and CNPS List 1B.2 species, is an annual herb in the celery family (*Apiaceae*). It has stout, branching stems 12 to 30 inches tall. The short petioled, sharply serrated leaves are 1 to 3 inches long. The flower heads are spherical-shaped and contain more than 10 flowers each. It blooms from June to October (Hickman 1993).

Delta button-celery is found in riparian scrub, often in vernal mesic clay depressions, at elevations between 9 and 100 feet amsl. Its range includes the Central Valley from Contra Costa County south to Fresno County. Habitat loss resulting from agriculture and flood control activities poses the greatest threat to existing populations (CNPS 2009).

The CNDDDB does not have any reported occurrences within 10 miles of the special-status plant species study area (CNDDDB 2003a, 2003b). Four known occurrences are located within the region in Merced County (outside of the regional area), all of which are presumed to be extant (Occurrences #17, #18, #21, and #22; CNDDDB 2003a, 2003b, 2003c).

Although the CNDDDB has no reported occurrences of delta button-celery within the regional area, the special-status plant species study area has the potential to be within the current range of this species. Potentially suitable but moderate quality riparian scrub and vernal pools have been identified within the special-status plant species study area; therefore, delta button-celery has a moderate potential to occur within the project footprint where these habitats occur.

5.3.18 Spiny-Sepaled Button-Celery (*Eryngium spinosepalum*)

Spiny-sepaled button-celery, a CNPS List 1B.2 species, is an annual herb in the celery family (*Apiaceae*). The stout, branching stems are between 12 and 30 inches tall. The leaves range from 3.5 to 13.8 inches long, are short petioled, and may be spiny-toothed or deeply-lobed. The flower heads are spherical or egg-shaped and contain more than 10 flowers each. This herb blooms from April to May (Hickman 1993).

Spiny-sepaled button-celery is found in valley and foothill grasslands and northern claypan vernal pools at elevations from 260 to 840 feet amsl. This species is found in Fresno, Madera, Merced, Stanislaus, Tulare, and Tuolumne counties. Habitat loss resulting from development, overgrazing, road maintenance, hydrological alterations, and agriculture poses the greatest threat to existing populations (CNPS 2009).

The CNDDDB reports a presumed extant occurrence of spiny-sepaled button-celery within the special-status plant species study area (Occurrence #32; CNDDDB 2003a, 2003b, 2003c); therefore, spiny-sepaled button-celery has a moderate potential to occur in California annual grassland and vernal pools within the project footprint.

5.3.19 Boggs Lake Hedge-Hyssop (*Gratiola heterosepala*)

Boggs Lake hedge-hyssop, a state-endangered and CNPS List 1B.2 species, is an annual herb in the snapdragon family (*Scrophulariaceae*). It has erect, hollow stems 0.8 to 3.9 inches tall. The leaves are opposite and have entire margins. Leaves near the base of the stem are 0.4 to 0.8 inch long and lance-shaped, but the leaves become shorter, wider, and blunt-tipped farther up on the stem. The yellow and white flowers are borne singly in the upper leaf axils and are 0.23 to 0.31 inch long. It blooms from April to August (Hickman 1993).

Boggs Lake hedge-hyssop grows on clay soils in marshes, swamps, vernal pools, and lake margins at elevations between 30 and 8,000 feet amsl. This species is found in Fresno, Madera, Merced, Lake, Lassen, Modoc, Placer, Sacramento, Shasta, Siskiyou, San Joaquin, Solano, and Tehama counties. Habitat

loss resulting from agriculture, development, overgrazing, trampling, and off-road vehicles poses the greatest threat to existing populations (CNPS 2009).

The nearest CNDDDB occurrence of Boggs Lake hedge-hyssop is located approximately 7 miles north of the special-status plant species study area in a vernal pool complex on a property south of Merced known as Flying M Ranch. This population was recorded in 2000 and is presumed to be extant (Occurrence #83; CNDDDB 2003a, 2003b, 2003c).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality California annual grassland and vernal pools are present within the special-status plant species study area; therefore, Boggs Lake hedge-hyssop has a moderate potential to occur in these habitat types.

5.3.20 California Satintail (*Imperata brevifolia*)

California satintail, a CNPS List 2.1 species, is a rhizomatous member of the grass family (*Poaceae*). It has hard, scaly rhizomes with stems that are 24 to 48 inches long. It has narrow leaves and a densely white-silky inflorescence. Anthers are brown, and the glumes are five-veined. It blooms from September to May (Hickman 1993).

California satintail often grows on alkaline or mesic clay soils in chaparral, coastal scrub, Mojave Desert scrub, meadows and seeps, and riparian scrub at elevations between 0 and 1,640 feet amsl. This species occurs in Butte, Fresno, Imperial, Inyo, Kern, Lake, Los Angeles, Orange, Riverside, San Bernardino, Tehama, Tulare, and Ventura counties. Habitat loss resulting from agriculture and development poses the greatest threat to existing populations (CNPS 2009).

The CNDDDB reported one occurrence of California satintail within the special-status plant species study area. The exact location is not known; however, this population is presumed to be extant (Occurrence #22; CNDDDB 2003a, 2003b, 2003c). Because a presumed extant occurrence and suitable riparian habitat are both present in the special-status plant species study area, California satintail has a high potential to occur.

5.3.21 Coulter's Goldfields (*Lasthenia glabrata* ssp. *coulteri*)

Coulter's goldfields, a CNPS List 1B.1 species, is an annual herb in the sunflower family (*Asteraceae*). It has an erect, branching stem about 24 inches tall with 7 to 15 yellow ray flowers. Leaves are linear, glabrous, and 2 to 6 inches long. The fruits are warty and hairy. It blooms from February to June (Hickman 1993).

Coulter's goldfields is found on alkali or mesic clay soils in meadows and seeps, playas, and vernal pools at elevations between 3 and 4,000 feet amsl. This species is found in Colusa, Kern, Los Angeles, Merced, Orange, Riverside, Santa Barbara, San Bernardino, San Diego, San Luis Obispo, Tulare, and Ventura counties. Habitat loss resulting from agriculture and development poses the greatest threat to existing populations (CNPS 2009).

The CNDDDB reports no occurrences within 10 miles of the special-status plant species study area (CNDDDB 2003a, 2003b, 2003c). The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality vernal pools are present within the special-status plant species study area; therefore, Coulter's goldfields has a moderate potential to occur in California annual grassland that supports vernal pools.

5.3.22 Heckard's Pepper Grass (*Lepidium latipes* var. *heckardii*)

Heckard's pepper grass is an annual herb in the mustard family (*Brassicaceae*) that occurs in alkali soils in valley grassland and wetland/vernal pool habitats (USFWS). It is 3 to 25 cm tall, densely hairy, with 5- to 10-cm long, linear leaves. Small, greenish flowers with ciliate petals are borne in dense spikes. This

variety is identifiable by its erect stems with well-spaced nodes and flat, oval fruits that are deeply notched at the top (Hickman 1993).

The nearest reported and presumed extant CNDDDB occurrence of Heckard's pepper grass is located approximately 16 miles west of the special-status plant species study area (Occurrence #14; CNDDDB 2003c).

It is a CNPS 1B.2 species and has been recorded in Merced County near the special-status plant species study area (CalFlora 2011/CNDDDB 2003c). Heckard's pepper grass is threatened by agricultural conversion, grazing, and urban development (CNPS). The study area is within the species' known range, and suitable habitat for this species occurs within the study area as well. Although presumed extant, it has a moderate potential to occur in the study area (CNDDDB).

5.3.23 Little Mousetail (*Myosurus minimus* ssp. *apus*)

Little mousetail, a CNPS List 3.1 species, is an annual herb in the buttercup family (*Ranunculaceae*). This small, tufted plant has narrow leaves that are 0.8 to 3.5 inches long with a cylindrical inflorescence up to 2.8 inches long consisting of clusters of inconspicuous, greenish-white flowers. The achenes are more or less rectangular. It blooms from March to June (Hickman 1993).

Little mousetail grows on alkaline soils in vernal pools and valley and foothill grassland at elevations between 65 and 2,115 feet amsl. This species occurs in Alameda, Contra Costa, Colusa, Lake, Merced, Riverside, San Bernardino, San Diego, Solano, Tulare, and Yolo counties. Habitat loss resulting from off-road vehicles, development, and agriculture poses the greatest threat to existing populations (CNPS 2009).

The CNDDDB reports no occurrences within 10 miles of the special-status plant species study area (CNDDDB 2003a, 2003b, 2003c).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality vernal pools are present within the special-status plant species study area; therefore, little mousetail has a moderate potential to occur in this habitat type.

5.3.24 Pincushion Navarretia (*Navarretia myersii* ssp. *myersii*)

Pincushion navarretia, a CNPS List 1B.1 species, is an annual herb in the phlox family (*Polemoniaceae*). It is a relatively small, low-growing plant with a recurved primary stem reaching no more than 0.65 inch tall. Leaves are linear and generally radiate from the base of the center stem. The white and tubular flowers generally bloom in May (Hickman 1993).

Pincushion navarretia grows on acidic soils in vernal pools at elevations between 65 and 1,090 feet amsl. Pincushion navarretia is currently known from fewer than 20 occurrences in Amador, Calaveras, Merced, Placer, and Sacramento counties. Habitat loss resulting from development and agricultural conversion poses the greatest threat to existing populations (CNPS 2009).

The nearest occurrence of pincushion navarretia is presumed to be extant near Flying M Ranch south of Merced and approximately 6 miles northeast of the special-status plant species study area (Occurrence #14; CNDDDB 2003a, 2003b, 2003c).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality vernal pools and California annual grassland are present within the special-status plant species study area; therefore, pincushion navarretia has a moderate potential to occur in these habitat types.

5.3.25 Shining Navarretia (*Navarretia nigelliformis* ssp. *radians*)

Shining navarretia, a CNPS List 1B.2 species and California endemic, is an annual herb in the phlox family (*Polemoniaceae*). It is a relatively small, low-growing plant with recurved stems typically 3 to 12 inches tall. Small, narrow leaves are twice pinnate and only 0.04 inch wide. The flowers are yellow with purple and brown spots on the lower lobes. It blooms from April to July (Hickman 1993).

Shining navarretia grows in cismontane woodlands, valley and foothill grasslands, and vernal pools at elevations between 250 and 3,300 feet amsl. Shining navarretia occurs in Fresno, Merced, Monterey, San Benito, and San Luis Obispo counties. Habitat loss resulting from development and competition from nonnative plants poses the greatest threat to existing populations (CNPS 2009).

The nearest reported CNDDDB occurrence of shining navarretia is located approximately 1 mile northeast of the special-status plant species study area and is presumed to be extant (Occurrence #44; CNDDDB 2003a, 2003b, 2003c).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality vernal pools and California annual grassland are present within the special-status plant species study area; therefore, shining navarretia has a moderate potential to occur in these habitat types.

5.3.26 Prostrate Vernal Pool Navarretia (*Navarretia prostrata*)

Prostrate vernal pool navarretia, a CNPS List 1B.1 species, is an annual herb in the phlox family (*Polemoniaceae*). This low-growing plant has stems bearing central floral heads and radiating leaves. Stems are generally leafless except those with floral heads. Hairs are typically recurved throughout. Flowers are blue to white with linear lobes. It blooms from April to July (Hickman 1993).

Prostrate vernal pool navarretia grows on alkaline soils in coastal scrub, meadows and seeps, and vernal pool grassland complexes at elevations between 45 and 2,300 feet amsl. Prostrate vernal pool navarretia is found in Alameda, Los Angeles, Merced, Monterey, Orange, Riverside, San Bernardino, San Benito, San Diego, and San Luis Obispo counties. Habitat loss resulting from development and agriculture poses the greatest threat to existing populations (CNPS 2009).

The CNDDDB reports the nearest occurrence of prostrate vernal pool navarretia as 10 miles from the special-status plant species study area, located in vernal pools of the Arena Plains National Wildlife Refuge. This population was last reported observed in 1999 and is presumed to be extant (Occurrence #24; CNDDDB 2003a, 2003b, 2003c).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality vernal pools and California annual grassland are present within the special-status plant species study area; therefore, prostrate vernal pool navarretia has a moderate potential to occur in these habitat types.

5.3.27 Colusa Grass (*Neostapfia colusana*)

Colusa grass, a federally threatened, state endangered, and CNPS List 1B.1 species, is an annual in the grass family (*Poaceae*). The stems are decumbent and characterized by a zigzag growth form. Overall stem length ranges from 3.9 to 11.8 inches. The entire plant is pale green when young and becomes brownish with age as the exudate darkens. Leaves range from 2.0 to 3.9 inches long. Each stem produces one dense, cylindrical inflorescence that is 0.8 to 3.1 inches long and 0.31 to 0.47 inch broad. Within the inflorescence, the spikelets are densely packed in a spiral arrangement. It blooms from May to August (Hickman 1993).

Colusa grass grows in large vernal pools on adobe clay soils at elevations between 15 and 365 feet amsl. This species is currently known from Colusa, Glenn, Merced, Solano, Stanislaus, and Yolo counties.

Habitat loss resulting from development, flood control activities, and agricultural conversions poses the greatest threat to existing populations (CNPS 2009).

Three occurrences of Colusa grass have been reported within 5 miles of the special-status plant species study area; however, these are reported in the CNDDDB as extirpated or possibly extirpated (Occurrences #12, #39, and #42; CNDDDB 2003a, 2003b). The nearest presumed extant occurrence is located approximately 5.1 miles north of the special-status plant species study area (Occurrence #43; CNDDDB 2003a, 2003b, 2003c). The closest occurrence of designated critical habitat for this species is more than 10 miles from the special-status plant species study area.

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality vernal pools are present within the special-status plant species study area; therefore, Colusa grass has a moderate potential to occur in this habitat type.

5.3.28 San Joaquin Valley Orcutt Grass (*Orcuttia inaequalis*)

San Joaquin Valley Orcutt grass, a federally threatened, state endangered and CNPS List 1B.1 species, is a tufted annual in the grass family (*Poaceae*). It grows 2 to 6 inches tall and is characterized by irregularly toothed glumes and widely elliptical fruits. Leaf blades are generally 0.05 to 0.3 inch wide. It blooms from April to September (Hickman 1993).

San Joaquin Valley Orcutt grass grows on volcanic basalt or clay substrates in vernal pool grassland complexes at elevations between 100 and 2,500 feet amsl. This species is found in Fresno, Madera, Merced, Solano, Stanislaus, and Tulare counties. Habitat loss, resulting from development, agriculture, overgrazing, and displacement by nonnative plants, poses the greatest threat to existing populations (CNPS 2009).

The CNDDDB reports one possibly extirpated occurrence of San Joaquin Valley Orcutt grass within the special-status plant species study area (Occurrence #10; CNDDDB 2003a, 2003b, 2003c). The nearest presumed extant occurrence is located approximately 0.9 mile northeast of the special-status plant species study area (Occurrence #51; CNDDDB 2003a, 2003b, 2003c). Critical habitat for this species is located within the special-status plant species study area.

Although extant occurrences of this species have not been reported in the special-status plant species study area, the presence of critical habitat and nearby extant occurrences warrant a determination that San Joaquin Valley Orcutt grass has a high potential to occur in California annual grassland and vernal pools.

5.3.29 Hairy Orcutt Grass (*Orcuttia pilosa*)

Hairy Orcutt grass, a federally and state endangered and CNPS List 1B.1 species, is a tufted annual in the grass family (*Poaceae*). The plant has several stems that are 2 to 8 inches tall and that branch only from the lower nodes. Each stem ends in a long, spike-like inflorescence. Leaves are grayish, with soft, straight hairs. The upper spikelets are densely crowded and hairy. It blooms from May to September (Hickman 1993).

Hairy Orcutt grass grows on volcanic basalt or clay substrates in vernal pool grassland complexes at elevations between 150 and 650 feet amsl. This species is found in Butte, Glenn, Madera, Merced, Stanislaus, and Tehama counties. Habitat loss, resulting from development, agriculture, overgrazing, trampling, and displacement by nonnative plants, poses the greatest threat to existing populations (CNPS 2009).

The nearest CNDDDB-reported occurrence is approximately 0.2 mile northeast of the special-status plant species study area, just east of Madera near the Santa Fe Railroad tracks and Avenue 15. This population was last seen in 1986 and is presumed to be extant (Occurrence #19; CNDDDB 2003a, 2003b, 2003c). Based on review of recent aerial imagery, potential habitat for this species appears to be present (Google

Earth 2010). The closest occurrence of designated critical habitat for this species is 4.7 miles from the special-status plant species study area.

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality vernal pools and California annual grassland are present within the special-status plant species study area; therefore, hairy Orcutt grass has a high potential to occur in these habitat types.

5.3.30 Merced Phacelia (*Phacelia ciliata* var. *opaca*)

Merced phacelia, a CNPS List 1B.2 species and California endemic, is an annual herb in the waterleaf family (*Hydrophyllaceae*). It grows from 3.9 to 21.7 inches tall. The leaves vary in size and shape, ranging from 1 to 6 inches long and from deeply-lobed to divided. Each branch tip is coiled like a scorpion's tail and holds many flowers. The individual bell-shaped flowers are blue with pale centers. It blooms from February to May (Hickman 1993).

Merced phacelia grows on heavy clay and sometimes alkaline soils in grasslands, on alkaline flats, on valley floors, and on open hills at elevations between 200 and 500 feet amsl. This species is known only in Merced County. Habitat loss resulting from development, overgrazing, agriculture, and displacement by nonnative species poses the greatest threat to existing populations (CNPS 2009).

Merced phacelia is presumed to be extant within the special-status plant species study area (Occurrence #6; CNDDDB 2003a, 2003b, 2003c). Because of a presumed extant occurrence and presence of suitable California annual grassland in the special-status plant species study area, Merced phacelia has a high potential to occur in this habitat type.

5.3.31 Hartweg's Golden Sunburst (*Pseudobahia bahiifolia*)

Hartweg's golden sunburst, a federally and state endangered species and CNPS List 1B.1 species, is an annual herb in the sunflower family (*Asteraceae*). It has one to three stems 2 to 6 inches tall, with narrow, undivided leaves. Hartweg's golden sunburst is distinguished from other members of the genus by the shape of its largest leaves, which are entire or three-lobed. The golden yellow flowers bloom from May to August (Hickman 1993).

Hartweg's golden sunburst is found on clay, often acidic, soils in chenopod scrub and valley and foothill grasslands at elevations between 150 and 1,000 feet amsl. This species is currently found in El Dorado, Fresno, Madera, Merced, Stanislaus, Tuolumne, and Yuba counties. Habitat loss resulting from development, overgrazing, trampling, and agriculture poses the greatest threat to existing populations (CNPS 2009).

No CNDDDB-reported occurrences of Hartweg's golden sunburst are recorded within 10 miles of the special-status plant species study area (CNDDDB 2003a, 2003b, 2003c). Outside of the regional area, 16 occurrences have been reported on the eastern edge of the San Joaquin Valley, including five in the general vicinity of the Merced to Fresno HST alternatives. Two of these are in Madera County, one of which is presumed extant (Occurrence #26) while the other is presumed to be extirpated (Occurrence #1). The three other occurrences in the vicinity are in Fresno County (Occurrences #21, #23, and #24), and all are presumed to be extant (CNDDDB 2003a, 2003b, 2003c).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality California annual grassland is present within the special-status plant species study area; therefore, Hartweg's golden sunburst has a moderate potential to occur in this habitat type.

5.3.32 Sanford's Arrowhead (*Sagittaria sanfordii*)

Sanford's arrowhead, a CNPS List 1B.2 species, is an aquatic perennial in the water plantain family (*Alismataceae*). It grows from 5.5 to 9.8 inches tall. The white flowers are in several whorls located well below leaf ends and bloom from May to October. The lowest whorl has three flowers with pistils but no stamens (Hickman 1993).

This species is found in diverse shallow, freshwater habitats, including marshes and swamps, ponds, vernal pools, lakes, reservoirs, sloughs, canals, streams, rivers, and ditches at elevations between 0 and 2,100 feet amsl. Sanford's arrowhead is found in Butte, Del Norte, El Dorado, Fresno, Merced, Mariposa, Orange, Placer, Sacramento, Shasta, San Joaquin, Tehama, and Ventura counties. Habitat loss resulting from overgrazing, development, recreational activities, nonnative plants, road widening, and channel alteration poses the greatest threat to existing populations (CNPS 2009).

Sanford's arrowhead was observed within the habitat study area during the April 2010 habitat reconnaissance surveys in an irrigation ditch north of the City of Merced. The nearest presumed extant occurrence of Sanford's arrowhead reported in the CNDDDB is located approximately 1 mile northeast of the special-status plant species study area in a ditch under the Santa Fe Railroad at Shaw Avenue in Fresno and was last reported in 1980 (Occurrence #7; CNDDDB 2003a, 2003b, 2003c).

Because this species has been observed in the habitat study area, and because the study area supports an array of natural and constructed watercourses and coastal and valley freshwater marshes, Sanford's arrowhead has a high potential to occur within the construction footprint.

5.3.33 Keck's Checkerbloom (*Sidalcea keckii*)

Keck's checkerbloom, a federally endangered and CNPS List 1B.1 species, is an annual herb in the mallow family (*Malvaceae*). The erect stems range from 6.0 to 12 inches tall. Leaves are 7- to 9-lobed and tapered at the base. The deep pink flowers have linear lobes 0.05 inch long. This species blooms from April to May (Hickman 1993).

Keck's checkerbloom grows on clay and serpentine substrates in cismontane woodland and valley and foothill grasslands at elevations between 500 and 1,500 feet amsl. This species is found in Colusa, Fresno, Merced, Napa, Solano, Tulare, and Yolo counties. Habitat loss resulting from development, overgrazing, agriculture, and displacement by nonnative species poses the greatest threat to existing populations (CNPS 2009).

The nearest CNDDDB reported occurrence of Keck's checkerbloom is located just north of Yosemite Lake, approximately 7 miles northeast of the special-status plant species study area. This population was last seen in 2006 and is presumed to be extant (Occurrence #6; CNDDDB 2003a, 2003b, 2003c). The closest occurrence of designated critical habitat for this species is more than 10 miles from the special-status plant species study area.

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality California annual grassland is present within the special-status plant species study area; therefore, Keck's checkerbloom has a moderate potential to occur in this habitat type.

5.3.34 Wright's Trichocoronis (*Trichocoronis wrightii* var. *wrightii*)

Wright's trichocoronis, a CNPS List 2.1 species, is an annual herb in the sunflower family (*Asteraceae*). It has slender, weak stems up to 10 inches long with opposite, linear leaves on the lower part of the stem; and it may have alternate or opposite leaves on the upper stem. The slender, white ray flowers are terminal and bloom from May to September (Hickman 1993).

Wright's trichocoronis is found on alkaline soils in marshes, seeps, swamps, riparian forest, and vernal pools at elevations between 15 and 1,435 feet amsl. This species is found in Colusa, Merced, San Joaquin, and Riverside counties. Habitat loss resulting from development, overgrazing, and agriculture poses the greatest threat to existing populations (CNPS 2009).

Occurrences of Wright's trichocoronis are not reported within 10 miles of the special-status plant species study area (CNDDDB 2009, 2010, 2011). One reported occurrence is outside the regional area, located in Merced National Wildlife Refuge in Merced County, approximately 12 miles west of the special-status plant species study area. This population was observed in 1997 and is presumed to be extant (Occurrence #8; CNDDDB 2003a, 2003b, 2003c).

The special-status plant species study area is presumed to be within the current range of this species, and potentially suitable but moderate quality riparian habitat and vernal pools are present within the special-status plant species study area; therefore, Wright's trichocoronis has a moderate potential to occur in these habitat types.

5.3.35 Caper-Fruited Tropidocarpum (*Tropidocarpum capparideum*)

Caper-fruited tropidocarpum, a CNPS List 1B.1 species, is an annual herb in the mustard family (*Brassicaceae*). It has prostrate to erect, hairy stems up to 20 inches long. The alternate leaves are deeply pinnate-lobed, and the flowers are yellow with spoon-shaped petals. It blooms from March to April (Hickman 1993).

Caper-fruited tropidocarpum is found on alkaline soils in valley and foothill grasslands at elevations between 3 and 1,660 feet amsl. This species is found in Alameda, Contra Costa, Fresno, Glenn, Monterey, Santa Clara, San Joaquin, and San Luis Obispo counties. Habitat loss, resulting from development, overgrazing, military activities, trampling, and competition with nonnative plants, poses the greatest threat to existing populations (CNPS 2009).

One historic occurrence of caper-fruited tropidocarpum has been reported within the special-status plant species study area from 1930 near Fresno (exact location unknown), and this population is believed to be extant (Occurrence #22; CNDDDB 2003a, 2003b, 2003c).

Because a presumed extant occurrence and potentially suitable California annual grassland are present within the special-status plant species study area, caper-fruited tropidocarpum has a high potential to occur within the construction footprint in this habitat type.

5.3.36 Greene's Tuctoria (*Tuctoria greenel*)

Greene's tuctoria is a federally endangered, state rare, and CNPS List 1B.1 species in the grass family (*Poaceae*). The plant is 2 to 6 inches tall with stems becoming decumbent and often purplish colored. The outward curving leaves are less than 1 inch long. The spikelet tips are irregularly short-toothed and deeply veined. Fruits are slightly flattened laterally. It blooms from May to July (Hickman 1993).

Greene's tuctoria grows on clay or Tuscan loam substrates in vernal pool grassland complexes at elevations between 100 and 3,515 feet. This species is found in Butte, Colusa, Fresno, Glenn, Madera, Merced, Modoc, Shasta, San Joaquin, Stanislaus, Tulare, and Tehama counties. Habitat loss resulting from development, agriculture, and overgrazing poses the greatest threat to existing populations (CNPS 2009).

Greene's tuctoria is presumed to be extant within the special-status plant species study area (Occurrence #28; CNDDDB 2003a, 2003b, 2003c). The closest occurrence of designated critical habitat for this species is more than 10 miles from the special-status plant species study area.

Because a presumed extant occurrence of this species and suitable habitat are present in the special-status plant species study area, Greene's tuctoria has a high potential to occur in California annual grassland that supports vernal pools.

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